AN

HISTORICAL AND DESCRIPTIVE

ACCOUNT

OF

THE DAGUERRÉOTYPE

AND

THE DIORAMA,

BY DAGUERRE.

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150th Anniversary
of the
Invention
of
Photography
1839 - 1989

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20th Anniversary
of the
American
Photographic
Historical
Society
1969 - 1989

THE LATE M. DAGUERRE.—FROM A DAGUERREOTYPE BY CLAUDET.

AN

HISTORICAL AND DESCRIPTIVE ACCOUNT

of the various Processes

OF THE

DAGUERRÉOTYPE

and the Diorama,

By DAGUERRE,

Painter, Inventor of the Diorama, a Knight of the Legion of Honour, and a Member of several Academies.

LONDON,

Mc Lean, 26 Haymarket;—Nutt, Bookseller, Fleet Street.

1839.

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CHAMBER OF DEPUTIES.

SECOND SESSION OF 1839.

THE PARTICULARS AND MOTIVES

OF A BILL

Tending to grant : 1st, to Mr. Daguerre, an annuity for life of 6,000 francs; 2d, to Mr. Niepce junior, an annuity for life of 4,000 fr., in return for the cession made by them of the process to fix the objects reflected in a *camera obscura*,

Presented by the Minister of the Interior.

SITTING OF THE FIFTEENTH JUNE 1839.

GENTLEMEN,

We believe that we shall have anticipated the desire of the House by proposing to you to make the acquisition, in the name of the State, of the property of a discovery as useful as it was unexpected, and, which, it is important, for the interest of the arts and sciences, should be brought before the public.

You all know, and some of you, Gentlemen, may have already had an opportunity of convincing yourselves of the fact, that, after fifteen years of expensive and persevering labour, Mr. Daguerre has at length succeeded in discovering a process to fix the different objects reflected in a camera obscura, and also, to describe, in four or five minutes, by the power of light, drawings, in which the objects preserve their mathematical delineation in its most minute details, and in which

the effects of linear perspective, and the diminution of shades arising from aerial perspective, are produced with a degree of nicety quite unprecedented.

We shall not dwell here on the immense utility of such an invention. It will easily be conceived what resources, what new facility it will afford to the study of science, and, as regards the fine arts, the services it is capable of rendering, are beyond calculation.

Draughtsmen and painters, even the most skilful, will find a constant subject of observation in this most perfect reproduction of nature. On the other hand, the process will afford them a quick and easy method of forming collections of sketches and drawings, which they would not be able to procure, unless they were to spend much time and trouble in doing them with their own hand, and even then they would be far less perfect.

The art of engraving, which consists in multiplying, by reproducing them, these figures, traced as it were from nature itself, will derive fresh and important benefits from the discovery.

In fact to the traveller, to the archaiologist and also to the naturalist, the apparatus of M. Daguerre will become an object of continual and indispensable use. It will enable them to note what they see, without having recourse to the hand of another. Every author will in future be able to compose the geographical part of his own work: by stopping awhile before the most complicated monument, or the most extensive *coup-d'œil*, he will immediately obtain an exact *fac simile* of them.

Unfortunately, the authors of this beautiful discovery cannot make an industry of it, so as to recover a part of the immense sacrifices that so many and long unsuccessful experiments have required. No patent that can be taken out will protect their invention. As soon as a knowledge of it be acquired, every body may apply it to their own purpose. With it, the most unskilful may make drawings, with the same dexterity as the most clever artist. The process will, therefore, either become the property of every body, or for ever remain a secret. What would not be the just regret of the friends

of the arts and sciences, if such an important secret were to remain impenetrable to the public, if it were to be lost, and die, as it were, in the hands of its inventors.

In such an exclusive case, it is proper that Government should come forward and enable the public to possess a discovery, which, it is of general interest, they should be allowed to enjoy to its fullest extent, by previously granting to its inventors the price, or we would rather say, a reward for their invention.

Such are the motives which have induced us to conclude with Messrs. Daguerre and Niepce a provisional treaty, of which the bill, that we have now the honour to submit to you, has for object to request your sanction.

Before we lay before you the fundamental clauses of this treaty, it is expedient that we should state some further particulars.

The possibility of fixing transiently the objects reflected in a *camera obscura*, was ascertained as early as the last century; but the discovery afforded no likelihood of success, for this reason, that the substance, on which the rays of the sun described the objects, possessed not the property of preserving them, and that the substance itself became instantly black when exposed to the light.

Mr. Niepce, senior, discovered the means of rendering the objects permanent. But, although he had succeeded in solving this difficult problem, still was his invention highly imperfect. He could only obtain a mere *silhouette* of the objects, and twelve hours at least were requisite to enable him to obtain a drawing of the smallest dimensions.

It is by quite a different course, and by completely laying aside the traditions of Mr. Niepce, that Mr. Daguerre has attained the admirable results which we now behold, that is to say, the extreme promptitude of the operation, and the re-production of aerial perspective, together with the full effects of shades and lights. The method of Mr. Daguerre is of his own invention, and is distinct from that of his predecessor, in its course as well as in its effects. However, whereas before the death of

Mr. Niepce, senior, a treaty had been concluded between the latter and Mr. Daguerre, whereby they mutually agreed to divide between them, whatever benefits they might reap from their respective discoveries; and whereas, this stipulation was extended in behalf of the son of Mr. Niepce, it would be impossible to treat with Mr. Daguerre alone, even as regards the process which he has not only brought to perfection, but has also invented. Besides, it would be hard to infer, that because the method of Mr. Niepce has hitherto remained in a state of imperfection, it may never be liable to be improved upon, or to be applied with success in certain circumstances, and that, for that reason, it is of little or no import to history and science whether it be given to the public at the same time as that of Mr. Daguerre or not.

These explanations, Gentlemen, will, we trust, give you fully to understand wherefore and in what right MM. Daguerre and the son of Mr. Niepce were admitted by us as the contracting parties in the convention, which you will find annexed to the bill which we now bring before you.

The sum of 200,000 fr. had in the first instance been asked, for the concession of the processes of Messrs. Niepce and Daguerre, and we think it right to state here, that offers made by the sovereigns of certain foreign powers fully justified such high pretensions. However, we have obtained that in lieu of the sum of capital required, a life interest only should be granted, viz.: a pension of 10,000 fr. revertible in equal halves only to the widows.

The attribution of this pension will be effected as follows:—

6,000 fr. to Mr. Daguerre;

4,000 fr. to Mr. Niepce's son.

Besides the reasons which we submitted to you above, one alone fully justifies this unequal division. Mr. Daguerre has consented to make public the processes, by which he produces the effects of the Diorama, an invention of which he alone possesses the secret, and which it would be a pity to lose.

Previous to signing the convention, Mr. Daguerre placed in our hands, but under seal, the description of the process of Mr. Niepce, that of his own method, and also that of the Diorama.

We can affirm, in this House, that these descriptions are complete and correct; for a member of this Chamber, whose name also may be considered an incontestable authority,* who has received from Mr. Daguerre, in confidence, communication of the whole of his processes, and who has himself made experiments, has examined one and all the documents in question, and certifies them to be correct.

We hope, Gentlemen, that you will approve the motives which have induced us to consent to the treaty, as well as the conditions on which it is granted. You will, we feel confident, participate in an idea which has already excited general sympathy, and you will never suffer us to allow any foreign power to have the glory of having bestowed on the learned and artistick world one of the most wonderful discoveries of which our country can boast.

* Mr. Arago.

THE BILL.

LOUIS-PHILIPPE,

KING OF THE FRENCH,

To all present and to come greeting.

We have ordered and do hereby order that the Bill of which the tenour follows, shall be presented, in our name, to the Chamber of Deputies, by our Minister Secretary of State of the Interior, whom we charge to explain the motives therefore, and to sustain the discussion thereof.

ARTICLE THE FIRST.

The provisional convention agreed to on the 14th june 1839, between the Minister of the Interior acting on account of the State and Messrs. Daguerrre and Niepce, the son, and annexed to the present law, is approved of.

ARTICLE 2.

An annual pension for life of 6,000 francs is granted to M. Daguerre, and an annual pension for life of 4,000 francs to the son of M. Niepce.

ARTICLE 3.

The above pensions shall be entered on the ledger of civil pensions of the public Treasury, and shall be enjoyed from the period of the promulgation of the present law. They shall not be subjected to the prohibitive laws which relate to accumulation, and shall be revertible by halves, to the widows of Messrs. Daguerre and Niepce.

Done at the Palace of the Tuileries, this 15th day of June 1839.

Signed LOUIS-PHILIPPE.

By the King:

The Minister Secretary of State,

Signed DUCHATEL.

Between the undersigned, Mr. Duchatel, Minister Secretary of State of the Interior, on the one part,

And Messrs. Daguerre (Louis-Jacques-Mandé), and Niepce junior (Joseph-Isidore), on the other,

The following has been agreed to :

ARTICLE THE FIRST.

Messrs. Daguerre and Niepce make over to the Minister o the Interior, acting on account of the State, the entire process invented by the father of Mr. Niepce, together with the various ameliorations introduced by Mr. Daguerre, and also the last process invented by Mr. Daguerre, to fix the different objects reflected in a *camera obscura*. They bind themselves by these presents to deliver into the hands of the minister of the Interior, a sealed packet containing the history and complete description of the said several processes.

ARTICLE 2.

Mr. Arago, a member of the Chamber of Deputies and of the Academy of Science, who has already taken cognizance of the said processes, will verify beforehand all the documents contained in said packet, and certify the correcness thereof.

ARTICLE 3.

The packet shall not be opened and the description of the processes be made public until after the adoption of the law-project mentioned hereafter : and then Mr. Daguerre will be bound, if so required, to perform an experiment in the presence of a committee appointed for that purpose by the Minister of the Interior

ARTICLE 4.

Mr. Daguerre also makes over and engages in like manner to communicate the entire processes of painting and physics characteristic of his invention of the Diorama.

ARTICLE 5.

He will be bound to make public any improvements in the one or the other invention which he may happen to make hereafter.

ARTICLE 6.

In payment of the above concessions the Minister of the Interior engages to ask of the Chambers, the grant to M. Daguerre, who accepts the same, of an annual pension for life of six thousand francs.

To M. Niepce, who also accepts, an annual pension for life of four thousand francs.

These pensions will be entered in the ledger of civil pensions of the public Treasury. They will not be subjected to the prohibitive accumulation laws, and be revertible by halves to the widows of MM. Daguerre and Niepce.

ARTICLE 7.

In case of non-adoption by the Chambers, during the present session, the bill containing the concession of the said pensions, and the present convention will be null and void, and the sealed packet will be returned to MM. Daguerre and Niepce.

ARTICLE 8.

The present convention to be registered at one franc premium.

Done in three copies at Paris the 14th day of June 1839.

All the above I approve of,

Signed T. DUCHATEL.

All the above I approve of,

Signed DAGUERRE.

All the above I approve of,

Signed J. NIEPCE.

For copy in conformity with the original, to be annexed to the Bill.

The Minister Secretary of State of the Interior,

Signed DUCHATEL.

CHAMBER OF DEPUTIES.

SECOND SESSION OF 1839.

THE REPORT *

Made in the name of the Committee ** charged to examine the Bill tending to grant: 1st, to Mr. Daguerre, an annual pension of 6,000 fr. for life; 2d, to the son of Mr. Niepce, an annual pension of 4,000 fr. for life, for the concession made by them of the process to fix the objects reflected in a *camera obscura*,

By Mr. ARAGO,

Deputy of the Upper Pyrennees.

SITTING OF THE SIXTH JULY 1839.

Gentlemen,

The interest which has been manifested in this House and elsewhere, in favour of the labours of which Mr. Daguerre has latterly laid the result before the public, has been lively, most striking, and unanimous. For this reason, does the Chamber, in all probability, only expect from your Committee, the latter's mere approbation of the Bill presented to you by the Minister of the Interior. Nevertheless, after due consideration, it has appeared to us that the mission with which you have deigned

* The notes and observations which Mr. Arago has added to this report, as published in the several accounts of the transactions of the Academy of sciences, will be found annexed.

** Consisting of Messrs. Arago, Etienne, Carl, Vatout, de Beaumont, Tournouër, Delessert (François), Combarel de Leyval, Vitet.

to honour us, imposes upon us a more explicit duty. We have come to the opinion, that although we fully concur in the happy idea of instituting national recompenses in favour of inventors whose interests do not come under the guarantee of the ordinary law of patents, it were fully expedient to point out, in our very first progress in this new era, with what reserve and scruples the Chamber shall act. By submitting the work of genius, on which we are now called to pronounce, to a most minute and severe examination, will you not totally damp the courage of any petty geniuses, who, in their ambition to rise, might also aspire to cast upon us a host of common, unimportant, fruitless productions; and also evince your intention to place a very high value on the recompenses which may be solicited of you in the name of national glory, as well as your determination never to sully such recompenses by bestowing them with prodigality.

These few words will give the Chamber to understand in what manner we have been induced to proceed in our examination, as to:

Whether Mr. Daguerre's process be incontestably an invention;

Whether this invention will actually tend to render to the science of archaiology, and to the fine arts, any eminent service;

Whether it can be put into common use;

And, lastly, whether it is likely to prove of any great improvement to science.

A natural philosopher from Naples, named *Jean Baptiste Porta,* discovered, about two centuries ago, that, by making *a very small aperture* in the shutter of a window well closed, or, better still, in a thin metallic plate applied to the shutter, every external object directly opposite the aperture will be carefully delineated on the wall opposite, and with dimensions, either large or small, according to their distance from the aperture, with their shape and position relatively exact, at least in a considerable extent of the picture; and depicted in the natural colours of the objects themselves. Porta found a short

time afterwards that there was no necessity that the aperture should be small; that it may even be of any size, provided it be carefully covered with one of those polished glasses, which, on account of their convex shape, are commonly called *lenses*.

The images shown through the aperture are of little intensity. On the others, a degree of light is cast, proportioned to the extent of the superficies of the lens which reflects them. The former are always somewhat confused. The latter, on the contrary, when they are reflected in a direct line on the focus, are described with beautiful nicety. This nicety has become really astonishing since the new achromatical glasses have been invented; because, to the plain lens, consisting of a single kind of glass, and, therefore, possessing as many distinct *foci* as there are different colours in the white light, it has been possible to substitute *achromatical lenses*, which unite the most *radii* possible in one single focus; and particularly, also, since the periscopical shape has been adopted.

Porta constructed portable cameras obscuras, each of these composed of a tube, more or less long, with a lens affixed thereto. The whitish paper, or pasteboard screen, in which the images were delineated, occupied the focus. The Neapolitan philosopher destined his small apparatus to persons who had no knowledge of the art of drawing. His method of obtaining views perfectly exact of the most complicated objects, was to trace carefully with the point of a pencil the outlines of the image reflected by the focus of the lens.

What Porta announced was never completely realized. Painters, draughtsmen, those in particular who apply their art to the construction of panoramas or dioramas, have frequently, even now, recourse to the camera obscura; but only to sketch at large the outlines of the objects, and to place them in their correct linear perspective position, and delineate them in their exact proportions. With regard to the production of effects dependent on the imperfect transparency of our atmosphere, and which have been very improperly denominated *aerial perspective*, the most proficient painters themselves did not expect that the camera obscura would prove of much use to them.

For this reason there is no one, who, after having observed the nicety of the outlines, the correctness of shape and colour, together with that of the shade and light of the images represented by th is instrument, has not greatly regretted that they should not be preserved *of their own accord*; no one that has not ardently desired the discovery of some means whereby to fix them on the focal screen : in the eyes of every body, it must be allowed this was a dream destined to be ranged among the fantastical conceptions of a Wilkins or a Cyrano de Bergerac. The dream, however, has come to pass. Let us take, Gentlemen, the invention from its very germ, and carefully follow it throughout its various stages.

Alchymists succeeded formerly in uniting silver with marine acide. The produce of the mixture was a white saline substance, which they called *moon* or *horn silver.** One of the most remarkable properties of this salt was to blacken when exposed to the light, and the more so when the light it was exposed to was vivid. Cover a sheet of paper with a coat of horn-silver, or what is now called *chloride of silver ;* form on this coat of chloride of silver, by means of a lens, the image of any object ; the obscure or dark parts of the image—that portion, we should say, on which no light can bear, will remain quite white; whereas that portion exposed to the light will, on the contrary, turn completely black—the half-tints will be represented by grey shades more or less dark.

Place an engraving on a piece of paper laid on with chloride of silver, and expose the whole to the rays of the sun, the engraving uppermost. The parts filled with black will attract the rays; the corresponding parts of the coat of those which those parts touch and envelop, will preserve their primitive whiteness. On those, on the contrary, where neither aquafortis nor the chisel have acted, and where the paper has preserved

* In the work of Fabricius *(De rebus metallicis)*, printed in 1566, will be found a long dissertation on a sort of *silver mine*, which was called *horn silver*, having the colour and transparency of horn, the fusibility and softness of wax. This substance when exposed to light, passed from a *yellowish grey* colour to a *violet*, and by a longer action almost to a black. This was natural horn-silver.

its semi-transparency, will the rays of the sun take the greatest effect, the coat of the saline substance will be turned black. The necessary result of the operation will, therefore be the production of an image exactly like the engraving as to shape, but the reverse with respect to colour, the white parts will be reproduced in black, and reciprocally.

These applications of this highly curious property of the chloride of silver, discovered by the ancients would, it would have been thought, have come to light long ago, and of their own accord ; but human intellect does not usually make such rapid progress. As it is, we must refer back to the early years of the 19th century to find the first traces of the photographical art.

Charles, our countryman, in his experiments, made use of paper prepared with a certain substance, to produce *silhouettes*, by means of an action by light. Charles died without the secret of the preparation, he made use of, having transpired ; so that it is but fair to attribute the first elements of the new art to a memoir of the well-known Wedgwood.

Wedgwood's Memoir was published in 1802, in the June number of the journal of the Royal Institution of Great Britain. The author professed to copy, by means of pieces of leather, or paper steeped in chloride or nitrate of silver, the painted windows of churches, or any kind of engraving. We quote his own words. " The images formed by means of a camera obscura, have been found to be too faint to produce, in any moderate effect upon nitrate of silver."

The commentator of Wedgwood, the illustrious Humphry Davy, does not contradict the assertion relative to the images of the *camera obscura*, but adds that he himself has succeeded in copying very small objects by means of a solar microscope, *but only at a short distance from the lens.*

However, neither Wedgwood nor Humphry Davy succeeded in discovering a process, to prevent, at the conclusion of the operation, their pictures turning black when exposed to the light. It naturally ensued that it was impossible to examine the copies they had obtained, by day light ; because all or

nearly so would have become uniformly black in a very short time. What then was there so wonderful, in images of which scarcely a glance could be obtained, and this only by the light of a small lamp, for they disappeared as soon as it was attempted to bring them to day light?

We will now pass over all the unsatisfactory and insignificant attempts of which we have just given the analysis, and proceed without further remark to describe the operations of Messrs. Niepce and Daguerre.

The late Mr. Niepce was a land-holder and had retired to the neighbourhood of Châlons-sur-Saône. He occupied his leisure hours in scientifical researches. One of his discoveries in particular, consisting of a certain piece of mechanism by which the elastic power of air, briskly heated, was to be made a substitute for steam, was put to a rather delicate test, in which it came off with some success, namely it was submitted to a minute examination by the French Academy of Science. Mr. Niepce commenced his photographical experiment as early as 1814. He became first acquainted with Mr. Daguerre, in January 1826. He learned, from an indiscreet optician of Paris, that Mr. Daguerre was also endeavouring to discover a process to fix the images reflected in a camera obscura. These facts are contained in letters which we have now before us. Therefore in case of controversy, the period of the first photographical labour of Mr. Daguerre can *safely* be asserted to be in the year 1826.

Mr. Niepce proceeded to England in 1827. In the month of December of that same year, he presented a memoir on his photographical labours to the Royal Society at London. To the memoir were annexed several proofs on metal, and obtained by the method already discovered by our fellow-countryman. A claim as to priority having been set up, these proofs, in good preservation, were readily produced by several English *savants*, to substantiate it. They incontestably prove that for photographical copying of engravings, he was in 1827 in possession of a method of making shades to correspond with shades, semi-tints with semi-tints, and lights with lights; that he moreover knew how, as soon as he had obtained his

copies, to make them proof against the blackening effects of solar light. In other words, by the selection of his preparation, the ingenious natural philosopher of Chalons, solved, as early as 1827, a certain problem which had set at defiance the high sagacity of a Wedgwood or an Humphry Davy.

The deed of partnership (duly registered) drawn up between Messrs. Niepce and Daguerre, for working in common the photographical processes, bears the date of 14th December, 1829. The subsequent deeds, passed between Mr. Isodore Niepce, the son and heir of Mr. Niepce, and Mr. Daguerre, mention, in the first place, the improvements made by the painter of Paris on the methods of the natural philosopher of Chalons; and, in the second, entirely new processes discovered by Mr. Daguerre, and possessing the advantage (in the exact terms of one of the deeds) to reproduce images sixty or eighty times quicker than by any process hitherto known.

This will explain several of the clauses of the contract (passed between the Minister of the Interior on the one part, and Mr. Niepce, junior, on the other), and which is annexed to the present law.

In what we said just now relative to the labours of Mr. Niepce, you will doubtless, have been struck by these restrictive words —*for Copying Photographic Engravings*. For, after a number of fruitless attempts, Mr. Niepce had himself also abandoned, or nearly so, all idea of ever succeeding in reproducing images of the camera obscura; for the preparation he made use of, did not blacken quick enough when acted on by the light—he required from ten to twelve hours to make a drawing; for, during such a lengthened space of time, the shades obtained were liable to be displaced; they passed from the left to the right of the objects: this displacing of the shades wherever it took place, produced flat and uniform tints; in the results by such a highly deficient method, the effects of light and shade were entirely lost, and in despite of these defects in the system, there was not even always a certainty of succeeding; the utmost precautions being taken, unforeseen or fortuitous circumstances might occasion perhaps only an imperfect result, or give only

incomplete representations of the original, or one replete with blank spaces; or, lastly, when exposed to the rays of the sun, the preparation on which the images were represented, if it did not become black, cracked, and chipped off as it were.*

* The following is a brief indication of the process of Mr. Niepce, and of the improvements made upon it by Mr. Daguerre:

Mr. Niepce dissolved *dry bitumen Judaicum* in oil of lavender. The evaporation of the mixture gave a thick varnish, which he then dabbed on a polished metallic plate, on one of plated copper, or covered over with a coat of silver.

The plate, when submitted to a slight heat, remained covered with a white and adhering coat; this was bitumen in powder.

The plate, thus coated, was placed in the focus of the camera obscura. In a short time, the outlines of an image were slightly perceptible. Mr. Niepce, in his well-known ingenuity, thought that there might be a possibility of rendering these objects more clearly perceptible. And, indeed, by dipping his plate in a solution of oil of lavender and petrol, he found that those parts of the coating of the plate, *which had been exposed to the light*, remained almost unaffected, whereas the other parts quickly dissolved, and left the plate almost blank. Having washed the plate with water, the image formed in the camera obscura became clearly perceptible; the shades corresponding with the shades, and the lights with the lights. The lights were formed by the diffused light arising from the whitish unpolished matter of the bitumen; and the shades, by the polished and naked parts of the reflector: provided, of course, that these parts were reflected on dark objects; provided, also, that they were placed in such a position as not to reflect on the eye any vivid light. The semi-tints, when any existed, might result from a part of the varnish, which a partial penetration of the dissolving power had rendered less dull than the parts unaffected.

The bitumen Judaicum, when reduced to impalpable powder, is not very white. It is, indeed, more of a greyish colour. The contrast between the lights and the shades, in Mr. Niepce's drawings, was scarcely perceptible. To add to the effect, the inventor conceived the idea of blackening, afterwards, the blank parts of the metal, and submit them to the action of sulphur of potash, or iodine; but he does not seem to have been aware, that the latter substance, when exposed to the light of the sun, is liable to continual transpositions. However, t will be perceived that Mr. Niepce had not the pretension to use it as a *sensitive* substance; that he applied it simply as a blackening substance, and only after the image was formed *in the camera obscura*; after he had strengthened this image, or, if you like it better, after this image was clear of the action of the dissolvent. In such an operation, what would have become of the semi-tints?

Among the principal defects, or imperfections, of M. Niepce's method, we must place this circumstance, namely: that too strong a dissolving power frequently broke the varnish here and there, nearly all over, and that too weak a one, again, did not sufficiently disengage the image. Success was never certain.

Mr. Daguerre imagined a method, which was afterwards called "*Méthode Niepce perfectionnée*," or, Niepce's method brought to perfection. At first he used the residue of the distillation of oil of lavender, instead of bitumen, on account of its more beautiful whiteness, and its great sensibility. The liquid subsequently run horizontally, in a very thin coat, over the metal, left behind,

By taking the counterpart of these imperfections, you will be able to form a somewhat correct idea of the merit of the methods discovered by Mr. Daguerre, after a series of the most intricate, laborious, and expensive experiments.

when duly evaporated, a uniformly pulverulent crust, which result it was impossible to obtain by dabbing.

The plate thus prepared being exposed to the focus of the camera obscura, Mr. Daguerre placed it in a horizontal position, and a little above a vessel filled with oil, raised to an ordinary temperature. In this operation, properly limited, and which, moreover, a mere *coup-d'œil*, would enable any intelligent person to appreciate,

The vapour arising from the oil, in no way affected the particles of the pulverized coating which had been submitted to the action of vivid light;

It partially penetrated, more or less, the regions of the said coating, which, in the camera obscura, corresponded with the semi-tints.

The remaining portions only were penetrated.

Here the naked metal was perceptible in no one part of the drawing; here, again, the lights were figured by the agglomeration of a great number of thick white particles; the half tints by particles equally condensed, but the whiteness and dullness of which had been more or less weakened; the shades by particles, equally numerous, and which had become quite transparent.

Greater brilliancy, a greater variety of shades, more regularity, the certainty of success, that of never being liable to efface the smallest portion of the image, such were the advantages of the improved method of Mr. Daguerre over that of *Mr. Niepce*; unfortunately, the residue of oil of lavender, although more liable to the action of the light than bitumen Judaicum, is so slow, as not to allow of the images being perceptible for some time after.

With the nature of the modification which the residue of the oil of lavender derives from the action of the light, and subsequent to which, the vapour arising from essential oils, when heated, penetrates that matter with more or less facility, we are not yet acquainted. Perhaps, it would be right to consider it as the mere drying of the particles; perhaps, on the contrary, as a fresh arrangement of those particles. This double hypothesis might be made to explain how the modification becomes less and less by degrees, and at length totally disappears, even in the darkest obscurity.

The Daguerreotype.

In the process, to which the public, in their grateful feelings towards the inventor, has given the name of *Daguerreotype*, the coating of the sheet of plated metal, which serves as the *canvass* to receive the images, is a coat of gold yellow, which covers the sheet of plated metal, when the same is placed in a horizontal position, and kept so with the silver undermost, in a box, at the bottom of which a few particles of iodine, exposed to spontaneous evaporation, are sprinkled.

When this sheet of plated metal is taken from the camera obscura, *not a single stroke is perceptible*. The yellowish coat of iodine of silver which has received the image, still appears of a perfectly uniform colour all over.

However, if the sheet be exposed, in a second box, to the ascending current

The weakest rays of light will modify the substance of the *Daguerreotype*. The effect is produced before the solar shades have had time to be displaced sufficiently, at least, to be perceived. The result is certain, provided the operator follow

of mercurial vapour, which arises from a tube in which that fluid is brought by the heat of a lamp lighted with spirits of wine, to a temperature of 75° centigrades, this vapour immediately produces the most curious effect. It attaches itself, in abundant quantity, to the superficial parts of the plate which have been struck by a vivid light; it produces no effect on those parts which have remained in the shade; and, lastly, strikes with great power on the spaces which were occupied by the half-tints, in larger or smaller quantities, according as, by their intensity, these half-tints became more directly connected with the light or the darker parts. With the assistance of the feeble light of a candle, the operator will be able to follow, step by step, the gradual formation of the image; he will perceive the mercurial vapour, like the finest hair-pencil, mark every part of the plate with its proper shade.

The image of the camera obscura being thus produced, the first care should be to prevent its alteration by the light of the sun. Mr. Daguerre succeeds in this, by agitating the plate in hyposulphite of soda, and washing it afterwards in warm distilled water.

According to Mr. Daguerre, the image is better reflected on a sheet of plated metal (on a sheet of silver laid over a sheet of copper), than on a single sheet of silver alone. This fact, supposing it to be thoroughly established, would seem to prove, that electricity forms an important part in these curious phenomena.

The sheet of metal must be first powdered over with pummice-stone, and then cleansed of verdigris, by means of nitric acid diluted in water. The influence of the acid, here so useful, may, in all probability, arise, as Mr. Pelouze is of opinion, from the fact of its not leaving on the surface of the silver the smallest particle of copper.

Although the thickness of the yellow coat of iodine, as it appears from various calculations made by Mr. Dumas, does not amount to one-millionth part of a *millimètre*, it is requisite, in order that the proportionate gradation of shades and lights be established, that the thickness be the same all over. Mr. Daguerre prevents the iodine collecting in larger portions on the edges than in the middle, by placing around the plate a kind of hoop of the same metal, 6 millimètres in breadth, and which is nailed on the wooden frame which supports the whole. The mode of physical action of this hoop has not yet been satisfactorily explained.

The following fact is not less mysterious: If it be desired that the image should produce the most effect in the ordinary position of pictures (that is, a vertical position), it will be requisite that the plate be presented in an inclined position of 45 degrees, to the vertically ascendant current of the mercurial vapour. If the plate were horizontal at the moment of the precipitation of the mercury, at the moment of the birth, as it were, of the picture, it must be viewed at an angle of 45 degrees, in order to catch the greatest effect.

In seeking to explain the singular process of Mr. Daguerre, one is apt immediately to form an idea, that the light in a camera obscura determines the evaporation of the iodine, wherever it falls upon the gold-coloured coating;

certain very simple directions. Lastly, when the images are once produced, the action of the rays of the sun, continued for years, will never injure either their brilliancy, their pureness, or their harmony.

Your committee have made necessary arrangements to allow all the members of the Chamber, if they wish it, to witness the experiment of the Daguerreotype, and thereby form an idea of the utility of the apparatus. As you look with wonder on the several pictures that will be handed to you for inspection, every one of you, Gentlemen, will be aware of the pro-

that the metal is perfectly cleansed; that the mercurial vapour acts freely on these cleansed or naked parts, during the second operation, and produces, thereupon, a mixture of white and dull colour; that the chemical object of the washing with hyposulphite is to clear away the parts of the iodine which have not been done so by the action of the light; and the artistical be object is, to cleanse the reflecting parts which are to form the shades.

But, according to this theory, what then would be those numerous and so beautifully proportioned half-tints which are to be admired in the drawings of Mr. Daguerre? One fact alone will be sufficient to prove that things are not so simple as this.

The sheet of plated metal does not increase so very much in weight when it receives the yellow iodine coating. Hardly, indeed, is it perceptible. The increase is, on the contrary, easily felt when it is acted upon by the mercurial vapour. Well! Mr. Pelouze has ascertained positively that, when washed with the hyposulphite, the plate, although there be a small quantity of deleterious matter on the surface, *weighs no less than before the operation*. It is evident, therefore, that the hyposulphite clears away the silver. The liquid, when chemically examined, actually evinces this fact.

In order to account for the effects of light to be observed in Mr. Daguerre's drawings, it seemed sufficient to admit that the sheet of silver enveloped itself, during the action of the mercurial vapour, with small spherula of amalgam, that these particles of amalgam, being very thick in the lights, gradually decreased in number in the half-tints, and totally disappeared when they came to the dark shades.

This conjecture has been verified. Mr. Dumas has discovered, with the aid of a microscope, that the lights and the half-tints are really formed by spherula, of which the diameter appeared to him, as well as to Adolphe Brongniart, to be very regularly an eight-hundredth part of a *millimètre*. If so, wherefore, then, is it necessary to incline the plate to 45 deg., at the moment of the precipitation of the mercurial vapour. Would this not then, allowing even this inclination to be indispensable with Mr. Daguerre, seem to indicate the intervention of crystalline needles or netting, which formed, became solid and collected, always in a vertical position, in a perfect or half-liquid, and had, therefore, relative to the sheet of metal, a position connected with the inclination given to the latter?

Thousands and thousands of beautiful drawings will be made with the *Daguerréotype*, ere its mode of action be completely analysed.

digious advantages which might have been derived during the expedition to Egypt, from a method so quick and perfect to reproduce objects ; every one of you will be struck with this reflection, that if photography had been known in 1798, we should now have correct images of a somewhat considerable number of emblematical pictures, of which the cupidity of the Arabs, or the fatal mania of certain travellers for destruction has for ever deprived the scientific world.

To copy the millions and millions of hieroglyphics with which even the outside of all the great monuments of Thebes, Memphis, etc., are covered, scores of years, and whole legions of painters would be required. One individual, with a Daguerreotype, would effect the labour in a very short space of time. Provide the Institute of Egypt with two or three sets of apparatus, and in several of the large plates of the celebrated work, the fruits of our immortal expedition, vast extents of real hieroglyphics will soon replace the fictitious ones ; and the drawings will every where surpass in copy and local colour the works of the most skilful painters ; and the photographic pictures being submitted in their formation to the rules of geometry, will allow us, with the assistance of a very few further data, to attain the exact dimensions of the highest parts of edifices and of those most difficult of access.

Those recollections (in which the artists, so zealous and so celebrated, who were attached to the army of the Levant, could not, unless by rendering themselves guilty of a most strange mistake, find the least shadow of blame) will doubtless attract attention to the works which are now executing in our own country, under the control of the committee of historical monuments. In a single glance it will then be easy to conceive the immense part which the photographic processes are destined to take in this grand national undertaking ; every one will comprehend with equal facility that the new processes will be distinguished for economy, a species of merit which, we are sorry to say, *en passant*, is, with regard to arts, rarely in proportion to the perfection of the productions.

Should it be asked whether the art, considered in itself, may not undergo some improvement if submitted to a careful

examination and an attentive study of the images drawn from whatever nature affords most soft and delicate, by rays of light. Mr. Paul Delaroche readily replies to the question.

In a note written at our request, theceleb rated artist asserts that the processes employed by Mr. Daguerre "carry certain essential conditions of the art to such a degree of perfection, that they will become, for even the most skilful painters, a subject of study and observation." What he was particularly struck with in the photographic drawings, is that the "finish, which is of a most inconceivable richness, is in no way discordant with the body of the picture, and in no way spoils the beauty of the general effect." "The correction of the outlining," adds Mr. Delaroche, "and the precision of forms are as perfect as they can be, in Mr. Daguerre's drawings. The painter will find in this process a quick mode of making collections for study, which he might not be able to obtain elsewhere, without great loss of time, with much trouble, and much less success, whatever degree of talent he might possess." Having refuted, by excellent arguments, the opinion of persons who have imagined that photography would be hurtful to artists, and particularly to engravers, Mr. Delaroche concludes his observations with the following reflection :—"In the whole, the admirable discovery of Mr. Daguerre is an immense service rendered to the fine arts."

We will refrain from adding one single word to such evidence.

You will remember, that one of the questions which we, at the commencement of our report, promised to discuss, was whether the process of photography could be applied to common use.

Without divulging what remains, and must yet remain, a secret until the adoption and promulgation of the law, we are at liberty to assert that it is on copper-plates, covered over with a thin silver plating, that the light is made to produce the images. It might, we must certainly say, have been more convenient for travellers, and also more economical, if paper could have been used. Paper impregnated with chloride, or nitrate of silver, was, indeed, the first substance Mr. Daguerre

thought proper to make use of; but the want of softness, the confusion of images, the uncertainty of success, the accidents that frequently occurred during the operation which tends to transform lights to shades, or shades to lights, could not fail to be discouraging to so clever an artist.

If he had persisted in preferring paper for this purpose, his photographic drawings might have been found worthy of being ranged in important collections, as a curious experiment in practical philosophy; but most certainly their merits would never have been discussed before you. However, if three or four francs, which is the cost price of each of the sheets of plating which Mr. Daguerre makes use of, should appear too dear, it is but fair to state that the same sheet may be used for a hundred different drawings.

The immense success of the present method of Mr. Daguerre is principally to be accounted for by its being operated on a coating of matter of extreme thinness, on what may be called a mere pellicle. We have nothing, therefore, to say relative to the price of the ingredients, for this price is a mere nothing.

One of the members only of your committee has seen the artist operate, and has operated himself. It is therefore on the personal responsibility of that deputy that we are able to entertain the Chamber with the Daguerreotype, as regards the conveniency of the apparatus. There is not one of the different branch operations of the Daguerreotype that every body cannot perform, even without any knowledge of drawing or of chemistry, and even with as much success as Mr. Daguerre himself.

The very short space of time in which the operation may be performed, is what has perhaps seemed the most astonishing: scarcely more than ten minutes are required during the dark days of the winter season to take a view of a monument, of a quarter of a city, etc.

In summer, when the sun shines in all his glory, half that time only will be requisite. In southern climates, two or three minutes at most will be sufficient. But it is important to observe, that the ten or twelve minutes of the winter season,

the five or six minutes of summer, the two or three minutes of the southern regions, express only the time during which the sheet of plating must receive the image through the lens.

To this, therefore, must be added the time taken to unpack the apparatus and to arrange the camera obscura, to prepare the metal sheet, that of the operation by which the image must be rendered inaccessible to the effects produced upon it by irruption of light. The time employed altogether in these various operations may amount to thirty minutes or three quarters of an hour. It was a mere illusion then, on the part of certain persons who, previous to undertaking a journey, declared their intention of taking the opportunity of the diligence travelling at a slow rate up a steep hill, to take a view of the surrounding scenery. It must also have been a dream of certain others who struck with the wonderful and miraculous reports which had been spread relative to the Daguerreotype, to suppose that it would be possible to apply photography to lithography. It is to the perfect polish, to the incalculable thinness of the coating on which Mr. Daguerre operates, that are due, the finish, the velvet softness, the beautiful harmony of photographic drawings. If such drawings were rubbed and dabbed, or pressed or rolled, in lithographic apparatus, they would be spoiled or completely destroyed. Did you ever hear of handling lace roughly, or rubbing the wings of a butterfly with a brush?"

* The absolute necessity of preserving the drawings of the Daguerreotype from being touched, had at first appeared an insurmountable obstacle to the propagation of the method. This is what induced me to be so vociferous, during the discussion before the Chamber, in my request, that an experiment might be tried in applying a varnish to these drawings. Mr. Daguerre, being but little inclined, as it will readily be supposed, to consent to any process likely to spoil, even slightly, the actual properties of his productions, I addressed my request to Mr. Dumas. This celebrated chemist found that the drawings of the Daguerreotype might be varnished by the following process: Pouring on the metallic plate a boiling solution of one part of *dextrine* in five parts of water. If it be found that this varnish do not act on the mercurial composition of which the image is formed, an important problem will be solved. For the varnish disappearing, when the plate is immerged in a quantity of boiling water, it will still be time to put things in the same state as before the experiment, in conformity to the wish of Mr. Daguerre; and, on the other hand, during a journey, the artist will not have run the risk of spoiling his collections.

The member of the Academy who has only been acquainted for the last few months, with the preparations which may be said to produce the beautiful drawings now submitted to us, has not thought proper yet to make use of the secret which he owes to the honorable confidence of Mr. Daguerre. He has deemed it delicate, before entering into the vast carreer opened to natural philosophy by the photographic process of Mr. Daguerre, to wait until national remuneration shall have put the same means of investigation into the hands of every observer. We can therefore, in our explanation of the scientific utility of the invention of our contryman, found our observations qn mere conjecture, as it were. The facts however are lucid and evident; and we do not fear that time will contradict our assertion.

The preparation on which Mr. Daguerre operates is a reactive, much more liable to the effects of light than any that has hitherto been made use of. The rays of the moon, we do not say naturally but condensed in the focus of a lens of the largest size, never produced any perceptible physical effect. The sheets of plated metal prepared by Mr. Daguerre on the contrary become so white, when exposed to the same light and to the subsequent operations, that we may really hope to make a photographic map of our satellite. That is to say that in a few minutes one of the longest, most minute and delicate labours of astronomy may be effected.

An important branch of the science of observation and calculation, the one that treats of the intensity of light, *Photometry*, has hitherto made but little progress. Physical experimenters have succeeded in determining the comparative intensity of two lights near each other, and which they can see simultaneously; but none have yet found a perfect method to effect the comparison when the latter condition does not exist; when the experimenter operates on a light now visible and on a luminary that will not be visible until and after the first will have disappeared.

The artificial lights of comparison, to which, in the cases we have alluded to above, the observer is obliged to have recourse, are but very seldom permanent, or as fixed as could be desired; but very seldom, and particularly when the intensity of

the light of the stars is to be tried, are our artificial lights sufficiently white. It is for this reason that there is a great difference between the determinations of comparative intensity of the sun and of the moon, of the sun and of the stars, given by equally skilful astronomers; it is for this reason that the sublime consequences of the latter comparisons, relative to the humble position of our sun amidst the thousands of millions of suns, of which the firmament is set, are still enveloped in a sort of mystery, even in the writings of the boldest authors.

We will not hesitate then to assert that the system of reaction discovered by Mr. Daguerre will hasten the progress of one of the branches of science which does the most honour to human knowledge. By its aid, the natural philosopher may in future proceed by absolute intensities. He will compare lights by their effects. If he deem it useful, he may obtain with equal facility a print of the dazzling rays of the sun, of those, three hundred thousand times weaker, of the moon, and of the rays of the stars. These prints he will make of equal intensity, either by weakening the strongest light, by an excellent method, resulting from recent discoveries, but which it is not proper to detail here, or by letting the most powerful rays act during a second only, for instance, and letting the action of the others last half an hour. However when observers apply a new instrument to the study of nature, what they have hoped to attain is always trifling in comparison to the succession of discovery which the instrument itself gives rise to. In this case, more chance should be placed on what is unexpected.* In case this

* Here is an application of which the Daguerreotype is susceptible, and seems to me extremely interesting:

Observation has shown that the solar phasma is not continuous, that there exist, in its solutions of transversal continuity, lines completely black. Are there similar solutions in the obscure rays which seem to produce effects of photogeny? If there be any, do they correspond to the black lines of the luminous phasma?

As several of the transversal lines of the phasma are visible to the naked eye, or when they are described on the retina without amplification, the above problem will be of easy solution. Let a kind of artificial eye be constructed, by placing a lens between the prism and the screen on which the phasma will play, and then the place of the black lines of the photogenous image, with regard to the black lines of the luminous phasma, be sought with the aid of a magnifyer, if necessary.

idea should seem paradoxical, we will quote a few practical examples in support of it.

Formerly some children fortuitously attached two lenses of different focuses to the two ends of a tube. In this manner, they created an instrument which magnified distant objects, and gave them the appearance of being quite near. Astronomers made use of this simple instrument with the mere hope of being better able to examine the stars, with which antiquity was familiar, but which had hitherto been studied but very imperfectly. Scarcely however was it turned towards the heavens, than myriads of new worlds became perceptible; than, penetrating into the constitution of the six planets of the ancients, it was found analogous to that of our earth, by the mountains of which it is easy to measure the elevation, by atmospheres of which the changes are easily traced, by phenomena of formation and of fusion of the polaric mountains, analogous to those of the terrestrial poles; by movements of rotation similar to that which in the earth is produced by the alternate change of day and night. When pointed to Saturn, the children's tube of the astronomical instrument maker of Midleburgh, discovered a phenomenon, of which the strangeness surpassed all that the most ardent imagination could ever have supposed. We allude to that ring, or if you prefer that we shall style it so, that bridge without piles, of 71000 leagues in diameter, 11000 leagues in breath, which circumscribes the globe of the planet, without being nearer to it at any point than 9000 leagues. Did any one foresee that applied to the observation of the four moons of Jupiter, the instrument would show that rays of light travel with a velocity of 80,000 leagues per second; that attached to graduated instruments, it would demonstrate that there are no stars of which the light can reach our horizon within three years; that following with it certain observations, certain analogies, one might even go so far as to conclude, with immense probability, that the ray of light which enables us, in a given moment, to perceive certain nebulous stars, has been shot from thither several millions of years before; or in other words, that these stars, on account of the successive propagation of light,

would be visible from the earth several millions of years after their complete annihilation.

The microscope would give rise to similar remarks, for nature is not less admirable nor varied in her littleness than in her grandeur. Used in the first place to observe insects, of which certain naturalists were desirous only of amplifying the formation, in order more easily to copy them for engraving, the micrsocope afterwards permitted the observer to examine in air, water, and all liquids, those animalculæ, those innumerable tribes of insects in which we may one day expect to find the germ of a rational explanation of the phenomena of life. Lately directed towards some small fragments of various stones, included among some of the hardest and of the most compact that are to be found on our earth, the microscope discovered to the wondering eyes of the observer that these stones had had life, that they consist of a paste formed of thousands of millions of microscopic animalculæ, soldered, as it were, in themselves.

It will be remembered that the above digression was intended to undeceive persons who were to blame for seeking to circumscribe the scientific applications of the processes of Mr. Daguerre within the bounds which we now give to them. Well! facts have already justified our anticipation. We might for instance allude to some ideas that have been formed on the rapid means of investigation which the topographer may borrow from the science of photography; but we will proceed more directly to our object, and relate to you a singular observation of which Mr. Daguerre was telling us only yesterday: he maintains that morning and evening equally distant from noon, and therefore corresponding to similar degrees of elevation of the sun above the horizon, are not however equally propitious for photographic operations. Thus, in every season of the year, and by atmospherical circumstances, to all appearance precisely similar, images may be formed rather quicker at seven in the morning, for instance, than at five in the evening; at eight than at four; at nine, than at three. Let us suppose this result to be correct, the meteorologist will be in possession of another

element for his pictures; and to the old observations of the state of the thermometer, the barometer, the hygrometer, and of the transparency of the air, he will now have an element which the first instruments were incapable of obtaining. he will make account for a peculiar absorption, which cannot but be highly influential to many other phenomena, to those in particular which come within the science of physiology and medicine.*

We have endeavoured, Gentlemen, to explain to you every most interesting point of the beautiful discovery of Mr. Daguerre, that regards novelty, utility in the fine arts, rapidity of execution, and the invaluable resources it will afford to science.

We have used our utmost efforts to enable you to participate in our convictions, because they are sincere, for we have minutely examined every phenomenon connected with this extraordinary discovery, and studied the effects with the scrupulous minuteness which you desired; because had it been possible to disavow the importance of the Daguerreotype, and the place which it cannot fail to hold in the esteem of all men, all hesitation on our part would have ceased when we should have beheld the pressing avidity of foreign nations in endea-

* The observation of Mr. Daguerre, on the comparative and constant dissimilitude of the effects of solar light, at times of the day when the sun is at equal elevation above our horizon, seems, we must confess, be set with difficulties of more than one nature, in the photometrical experiments which are performed with the aid of the Daguerreotype.

In general, one would be little disposed to admit that the same instrument could ever be used for portraits. The problem, in fact, infers two conditions, to appearance, in direct controversy. In order that the image be quickly formed, that is to say, during the four or five minutes that a living person can be required to remain in a state of immobility, the person must stand in the sun: now, if a person be exposed with his face in the sun, he will not be able to keep his eyes motionless; the person of the gravest disposition would not be able to refrain from the most hideous contortions of the features, which would thus be completely altered.

Fortunately, Mr. Daguerre, has ascertained that, with regard to the iodate of silver of which the coating of the plates is formed, that the rays, which are made to pass through certain blue glasses, produce almost all the photogenous effects. By placing one of these glasses between the person whose portrait is to be taken and the sun, the image will be obtained almost as quick as if there were no glass, and moreover the light being very soft, there will be no fear of distortion of the features.

vouring to profit by an erroneous date, a fact held in doubt, pretexts of the most frivolous nature, to substantiate a claim to priority, to try to add the brilliant ornament which will always be formed by photographical processes, to the crown of discoveries which every one of these nations is wont to wear. We must not forget, indeed, to proclaim, that all discussion on this point must be at an end, less on account of well authenticated proofs, which fully establish the rights of Mr. Daguerre, and which we have before us, than on account of the inconceivable degree of perfection which Mr. Daguerre has attained. Your committee, therefore, is unanimously of opinion that you adopt, without alteration, the bill as proposed by the government of his Majesty.

'It has been inquired, whether, having obtained, by means of the Daguerreotype, the most admirable gradations of tints, it would not be very easy to make it produce colours; and substitute, to be more explicit, coloured pictures for the species of *aqua tinta* engravings which it now produces.

This problem will be solved, as soon as the discovery will be made of ONE *and the same* substance, which red rays will colour red, yellow rays yellow, blue rays blue, and so on. Mr. Niepce has already described the effects of this nature, in which, in my opinion, the phenomenon of the coloured rays may be said to take a great part. Perhaps the same was the case with the *red* and *violet* which Seebeck obtained simultaneously from chloride of silver at the two extremities of the phasma. Mr. *Quetelet* has just communicated to me a letter, in which Sir John Herschel informs him that his sensitive paper, having been exposed to a very powerful *sun reflector*, described afterwards all the variegated colours of the prism, with the exception of the red. In presence of these facts, it would certainly be extremely hazardous to assert that the natural colours of objects can never be produced in photogenous images.

Mr. *Daguerre*, during his first experiments connected with phosphorescence, having discovered a powder which emitted a red glimmering light, when acted upon by a red light; and another powder to which blue communicated a blue phosphorescence; a third species of powder which, in the same circumstances, became luminous and green by the action of a green light; he mixed these powders mechanically, and also obtained a unique composition which became red in red, green in green, and blue in blue. Perhaps, by proceeding in the same manner, by mixing various species of resin, it might be easy to obtain a varnish in which each light would imprint, not phosphorically, but photogenously, its colours.

CHAMBER OF PEERS.

SITTING OF THE THIRTIETH OF JULY, 1839.

THE REPORT

Of Mr. GAY-LUSSAC, in the name of a special committee * charged to examine the Bill relative to the acquisition of the process invented by Mr. Daguerre to fix the images of the camera obscura.

GENTLEMEN,

All that tends to contribute to the progress of civilization, to the physical or moral improvement of mankind, should be the constant object of the solicitude of an enlightened government; and those who by successful endeavours, assist in such a noble task, will at all times be deserving of honorable recompense for their services.

It is thus that titular laws on copyrights and various branches of industry have already ensured to authors and inventors profits proportioned to the importance of the services rendered to society.

However, if this mode of encouragement is, generally speaking, the best, yet, in some instances, it is impracticable, and at the least inefficient, and particularly in cases where great and important discoveries require great and important recompense.

* This committee was composed of Messrs. le Baron Athalin, Besson, Gay-Lussac, Marquis de Laplace, Vicomte Simeon, Baron Thénard, Comte de Noé.

Such, Gentlemen, is our opinion of the discovery of Mr. Daguerre, and such is the light in which it has been viewed by the King's government, by whom it has been made the object of the Bill now before you, and by the Chamber of Deputies, which has already granted its sanction to that Bill.

You have been made acquainted with the discovery of Mr. Daguerre, and have been able to judge of it from the various drawings that have been presented to you, and from the report on it, read to the Chamber of Deputies, by the illustrious *savant* who was commissioned to examine it. It consists of the art of fixing images reflected in a camera obscura on a metallic surface, and of preserving them.

We must say, however, without it being at all our intention to decry the incontestable merits of the discovery, that the painter's palette will not be very varied; for black and white will be the only colours he will require. The images, depicted in natural and lively colours will long, perhaps for ever, remain unattainable by human sagacity. But still we do not feel the temerity to impose limits to that sagacity, for Mr. Daguerre's success has laid the foundation of a new order of possibilities.

Being called upon to give our opinion on the importance and future prospects of the discovery of Mr. Daguerre, we have founded that opinion on the perfection itself of the results, according as they appear in the report read in the Chamber of Deputies by Mr. Arago, and on fresh communications which we have received from that illustrious *savant* as well as from Mr. Daguerre himself. Our conviction of the importance of the new process is now as clear as it can be, and we should be happy if we could but make the Chamber concur with us.

One fact is certain, that, by the discovery of Mr. Daguerre, natural philosophy is in possession of a system of reaction most curiously open to the influence of light, of a new kind of instrument, which will be, for the intensity of light and for luminous phenomena what a microscope is for small objects, and which will afford scope for further and perhaps more important investigations. This reactive has already received, although

in a very slight degree, the impression of the rays of the moon, and Mr. Arago has conceived the hope to be able, by its assistance, to trace a chart of that satellite.

The perspective of the landscape of every object is retraced with mathematical preciseness; not an accident, not a line, however imperceptible, escapes the eye and the pencil of this new painter; and as three or four minutes are sufficient for execution, a field of battle, with its successive phases, can be drawn with a degree of perfection that could be attained by no other means.

The arts of industry for the representation of forms, drawing in order to obtain perfect models of perspective and of the distribution of light and shade, natural sciences for the study of species and of their organisation, will doubtless make numerous applications of Mr. Daguerre's process. In short, its application to the taking of portraits is a thing nearly resolved on, and the difficulties which are yet to be encountered have been fully considered and no doubt exists but that they will be entirely overcome. Nevertheless it must not be forgotten that coloured objects are not reproduced with their natural colours; and that the harmony of light and shade in coloured objects is necessarily altered owing to the divers luminous rays not acting alike on the reactive employed by Mr. Daguerre. This is a limit which nature herself has placed to this new process.

These, Gentlemen, are the results which have been already acquired, and the expectations about to be realised from Mr. Daguerre's discovery. Nevertheless some explanation was necessary respecting the execution of the process, and the committee thought it could not be obtained in amore safe or more authentic manner than from the honorable Deputy, in whom Mr. Daguerre had first confided, and who had been afterwards similarly honored by the Minister of the Interior and by the other Chamber. Mr. Arago, at there quest of the President of the committee, repaired thither, and confirmed with fresh details what he had already stated in his interesting report. Thus, it is certain that the execution of Mr. Daguerre's process will require but very little time and but a trifling outlay after the purchase of the apparatus which may be rated at the sum of 400 francs (16*l.*)

Any one will infallibly succeed after a few attempts, since Mr. Arago himself, after his initiation, made his debut in the most successful manner, and his performance would have been eagerly sought after, had it escaped the flames which consumed the Diorama.

Were further evidence necessary, the reporter of your committee could add that Mr. Daguerre has also confided to him the secret of his process and has described to him all its operations. He can affirm that the process is not expensive and that it can easily be executed by persons little skilled in drawing, when, to the precepts which Mr. Daguerre has pledged himself to publish, he shall also join an example. For the interest of that gentleman as well as for that of the process, success is necessary, and Mr. Daguerre will doubtless employ his utmost to ensure it.

Your reporter must also add that, although he has not, like his honorable friend Mr. Arago, tried the process, he judges it, from the account which has been given him, to be one which must have been very difficult to discover, and must have cost, in order to reach the perfection which it has attained from Mr. Daguerre, much time, numberless attempts, and above all a most wonderful perseverance which is strongly excited by failure and which never belongs but to those who are gifted with strong minds. The process, in fact, consists of successive operations without apparently any necessary connection, and of which no single result is sensible until after the termination of them all. And assuredly, if Mr. Daguerre had been inclined to confine his process to himself or to a few trust-worthy persons, he ran no danger of losing his secret.

It may be therefore asked, and in fact the question has been made, why, if Mr. Daguerre's process was so difficult to be discovered, he did not turn it to his own private account, and why, in opposition to those prudent laws which are alike the safe-guard of private property and of the fortune of the State, Government has thought proper to purchase the secret and to lay it before the public. We will reply to both the questions.

The principal advantage of Mr. Daguerre's process consists in obtaining at once rapidly and most precisely the image of objects, either to be preserved or to be reproduced afterwards by

the means of engraving or lithography; and therefore it can be conceived that it would not have met with sufficient aliment when confined in the hands of one individual.

On the other hand, this process, when made public, will meet with numerous applications by painters, architects, travellers and naturalists.

In short, confined to one person, it would remain for a long time stationary, and perhaps would die away, whereas this being made public, it will thrive and improve through general practice.

Thus it was essential that it should become the property of the public.

In another respect it was natural that Mr. Daguerre's process should attract the attention of government and procure its discoveries a just recompense.

For those who are not insensible to national glory, who are aware that the eclat of one nation, with respect to others, never shines more than by the improvement it makes in civilisation, for those, we affirm, Mr. Daguerre's process is a grand discovery. It is the origin of a new art in the midst of an old civilisation; it will make an epoch and will be preserved as a title of glory. Should it go down to posterity accompanied by ingratitude? Let it rather be recorded as a striking proof of the protection granted to great discoveries by the Chambers, the government of July, and the whole nation.

In fact, the Bill in favour of Mr. Daguerre is an act of national munificence. To that Bill we have given our unanimous assent, but not without remarking how great and honorable is a recompense voted by the country. And we do so intentionally to bring to mind, though not without regret, that France has not always manifested her gratitude in this manner, and that too many fine and useful works, too many works of genius, have procured those to whom it is due but a glory often barren. These however are not recriminations, which we wish to bring forward; they are errors, which are to be deplored in order to avoid falling into others.

Gentlemen, after having appreciated, as much as lay in our power, the importance of Mr. Daguerre's discovery, we remain

convinced that it is new, full of interest, promising a rich harvest, and in fine, that it is worthy of the high favour of national remuneration which has already been voted in its behalf by the Chamber of Deputies. The committee are unanimously in favour of the pure and simple adoption of the bill, and, as their reporter, I have been directed to propose to you its adoption.

ADVERTISEMENT.

Mr. Niepce was engaged, since 1814, in endeavouring to fix the images of the *camera obscura*, but more especially the *copying of engravings* attached to substances sensible to the action of light.

In 1824, Mr. Daguerre commenced making experiments on light for the sole purpose of fixing the image of the *camera obscura*, for he considered the copying of engravings by such a process as being of no value relative to the improvements of the art.

In 1829, Mr. Daguerre entered into an association with Mr. Niepce, for the improvement of the process of the latter gentleman.

Mr. Niepce gave the name of Heliography to his discovery, and wrote a description of it in order to communicate it to Mr. Daguerre, and to enable him to improve it. Mr. Daguerre thought proper to join to that notice several notes containing the observations which he made to Mr. Niepce on receiving his communication. These notes are not

written in a critical view, but simply to make known the precise situation of this discovery, which might appear from the description of its author to offer a perfection that it is far from having attained notwithstanding the improvements it has since received.

NOTICE

ON HELIOGRAPHY,

BY J. N. NIEPCE.

The discovery I have made and which I call *Heliography*, consists in reproducing *spontaneously*, by the action of light, with gradations of tints from black to white,* the images received in the camera obscura.

FUNDAMENTAL PRINCIPLE OF THIS DISCOVERY.

Light, in its state of composition and decomposition, has a chemical action on bodies. It is absorbed, it combines with them and communicates new properties to them. Thus it augments the natural consistence of certain bodies; it makes them solid, and renders them more or less insoluble, according to the duration or intensity of its action. Such, in a few words, is the principle of the discovery.

FIRST MATERIAL.—PREPARATION.

The first substance or material which I employ, the one which has succeeded the best, and which causes the most immediate production of effect is *Asphaltum* or *Bitumen Judaicum* prepared in the following manner :—

I fill a glass one half with this bitumen in powder, and pour on it, drop by drop, essential oil of lavender, till the bitumen

NOTES BY MR. DAGUERRE.

* The lightest tint resulting from this process is not white.

ceases to absorb it and becomes saturated. I then add a sufficient quantity of this essential oil to be about a quarter of an inch above the mixture, which must then be covered and exposed to a gentle heat till the essence added becomes saturated with the colouring matter of the bitumen. Should this varnish not be sufficiently consistent, allow it to evaporate by then exposing it to the open air in a capsule, but it must be preserved from damp which injures it, and which in time will decompose it. This inconveniency is principally to be feared in this cold and damp season for the experiments which are made in the camera obscura.*

A small quantity of this varnish put on cold, with a stump made of soft leather, on a plate of plated silver, perfectly smooth, produces a fine gold colour, and can be laid on thin and very even.** The plate is then placed on a hot iron covered with paper several times doubled, from which all damp is thus previously extracted; and when the varnish ceases to be sticky the plate is removed in order to cool, and is dried in a mild heat, and unexposed to any moist air. I must not forget to observe on this subject that it is principally in applying the varnish that this precaution is indispensable. In this case, a light disk, containing in its centre a short stem which is placed in the mouth, suffices to stop and condense the humidity arising from breathing.

The plate thus prepared may be immediately subjected to the impressions of the luminous fluid; but, even after having been exposed to them long enough for the effect to have taken place, nothing indicates that it really exists; for the imprint remains unperceived.*** The question therefore is to render it free, and this is attained only by the aid of a dissolvent.

* This notice was written in December.

** It is impossible by such means to put on a layer sufficiently even to obtain, in the camera obscura, the delicacy acquired by the modifications of light.

*** Were the image quite imperceptible, there would be no result; there must consequently be a slight appearance of the action of the light in order to produce effect.

OF THE DISSOLVENT.—MANNER OF PREPARING IT.

As this dissolvent must be conformable to the result desired, it is not easy to give the exact proportions of its composition; but all things considered, it had better be too weak than too strong.* The one I prefer consists of one part, not in weight, but volume, of essential oil of lavender, and ten parts of *white oil of Petroleum*. The mixture, which at first is milky, becomes perfectly clear in two or three days. This composition can be used several times successively. It loses its dissolving quality only when it approaches the term of saturation; this is ascertained by its becoming opaque and of a very dark colour, but it can be distilled and rendered as good as ever.

The varnished plate being withdrawn from the camera obscura, a sufficient quantity of the dissolvent to cover the whole plate is poured into a tin vessel an inch deep, longer and wider than the plate. The plate is then dipped into the liquid, and on looking at it in a peculiar angle in a bad light, the imprint is seen to appear and to show itself gradually, although still veiled by the oil that floats more or less saturated with varnish. The plate is then taken out and placed vertically, to drain off the dissolvent. When this is done, the final operation, which is not the least important, is to be commenced.

MODE OF WASHING.—MODE OF PROCEEDING.

For this it is necessary to have a simple apparatus consisting of a plank four feet long and wider than the plate. This plank is provided, horizontally and lengthways, with two well-joined rims, about two inches high. This is fastened to something firm by its upper extremety, by means of hinges which allow it to slope at will, so that the water poured on it may obtain the requisite degree of rapidity. The lower extremity of the plank terminates in a vessel destined to receive the liquid which runs off.

* Both of these cases give rise to inconvenience; in the former case, the image does not appear sufficiently, and in the latter it is completely carried away.

The plate is then placed on this inclined plank, which is prevented from sliding by being supported against two small cramp irons which must not exceed the thickness of the plate. In this season, it is necessary to make use of lukewarm water. This is not to be poured on the plate, but above it, so that on reaching it, it may fall in a sheet, and carry off the remaining portions of oil adhering to the varnish.

Now the imprint is completely free, and every where quite distinct, if the operation has been well conducted, and especially if the operator has made use of the *improved** camera lucida.

APPLICATION OF THE HELIOGRAPHIC PROCESS.

As the varnish employed can be applied indifferently on stone, metal and glass, without making any change in manipulation, I shall confine myself to the mode of application on plated silver and glass, in observing nevertheless, with respect to engraving on copper**, that a small quantity of wax dissolved in the essential oil of lavender may be added in the composition of the varnish, without the slightest inconvenience.

As yet nothing in my opinion is superior to plated silver for the reproduction of images, on account of its whiteness and its consistence. It is certain that after washing, provided the imprint be quite dry, the result obtained is already satisfactory. It would nevertheless be extremely desirable to be able to obtain, by blackening the plate, every gradation of tint from black to white. I have turned my attention to this subject, and employed at first the *hydro-sulphurit of potash,* but this liquid, when concentrated, deteriorates the varnish, and if diluted, it merely

* This, on the part of Mr. Niepce, is a mere hypothesis, and experience has proved that the achromatic camera obscura, although it produces images more purely, does not allow them to obtain the great distinctness he expected.

** It must be remarked, that the engraving Mr. Niepce speaks of, was always done by the contacts of prints placed on a sensible matter, and that the application of wax, to which he alludes, would have neutralized the effect of the decomposition of the bitumen in the camera obscura, into which light enters extremely weakened; but the presence of this wax was no obstacle for his copies of engravings which he exposed to the direct rays of the sun during three or four hours.

reddens the metal. This twofold inconvenience obliged me to give it up. The substance which I now employ, with greater hopes of success, is *iodine** which has the property of becoming vapour at an ordinary temperature. To blacken the plate by this process, it is simply necessary to place it against one of the inner sides of a box opened on the top, and to put a few grains of *iodine* in a small groove made in the length of the opposite side at the bottom of the box. This is afterwards covered with a glass in order to judge of the effect, which is slower in its progress, but much more certain. The varnish can then be removed by alcohol, and no trace of the primitive imprint then remains. As this process is still quite new to me, I shall confine myself to this simple modification, till experience shall enable me to obtain more positive details on the subject.

Two attempts to take a view on glass in the camera obscura presented results which, although defective, deserve to be related, because this kind of application can be more easily improved and may hereafter become peculiarly interesting.

In one of these attempts, the light having acted with less intensity exposed the varnish so as to render the gradations of tints much more visible ; so that the imprint, seen by *transmission*, reproduces to a certain extent the known effects of the *Diorama* **.

In the other attempt, on the contrary, the action of the luminous fluid was more intense, and the lightest parts not having been attacked by the dissolvent, remained transparent; and the difference of the tints arises solely from the relative thickness of the layers more or less opaque with varnish. If the imprint be seen by *reflection* in a mirror, on the varnished side and in a peculiar angle, it produces great effect, whereas, if seen by *transmission*, it presents a confused and colourless

* It is highly important to observe, that the employment of Iodine, which was made by Mr. Niepce, to blacken his plates, proves that he was not aware of the property possessed by this substance, when put in contact with silver, namely, that of becoming decomposed on being exposed to light, as he, on the contrary, indicates it as a means of fixing his effects.

** Mr. Daguerre sees no connection whatever between the effects here mentioned by Mr. Niepce and the pictures of the diorama.

image; and the astonishing part of this is that it seems to affect the local colours of certain objects. * From this remarkable fact my reflections deduced inductions by which it might be connected with Newton's theory on the phenomenon of coloured rings. For this, it would suffice to suppose that a prismatic ray, the green ray, for instance, in acting on the varnish and combining with it, should give it a necessary degree of solubility for the layer arising from it after the twofold operation of the dissolvent and washing, *to reflect the colour green.* However it is for observation alone to ascertain how far this hypothesis may be exact, and the thing in my opinion seems interesting enough in itself to excite further researches and to give rise to a more profound examination.

OBSERVATIONS.

There is doubtless nothing difficult in employing the means of execution which I have just mentioned, yet nevertheless the first attempt might not be attended with success. I think therefore that it would be advisable to begin by copying engravings by means of *diffused light* according to the following simple preparation.

Varnish the engraving on the *wrong* side so as to make it quite transparent; when perfectly dry, place its *right* side on the varnished plate, by means of a glass the pression of which is lessened by the plate being inclined to an angle of 45 degrees. In this manner, with two engravings prepared as above, and four small plated plates, several experiments may be made in a day, even in gloomy weather, provided the room be not cold, and more especially damp, which, I repeat, injures the varnish to such an extent, that it comes off the plate in flakes on being dipped into the dissolvent. For this reason, I ceased to employ the camera lucida during the damp season. By practising

* Mr. Daguerre has often observed this colouring, but has never considered it the result of the coloured rays in the camera obscura.

the experiment above mentioned, a short time will render any one familiar with the process of manipulation.*

With respect to the manner of putting on the varnish, I have to observe that it must be employed sufficiently consistent to form at the same time a layer compact and as thin as possible, because it resists the action of the dissolvent much better and at the same time is much more sensible to the impression of light.

With respect to *iodine*, for blackening the proofs on silver, as well as with respect to *acid* for engraving on copper, it is essential that the varnish, after washing, should be, as stated in the second attempt, on glass above mentioned: for then it is more permeable to the *acid* or to the *iodine*** emanations, principally in the parts, where it has preserved its transparency, and it is but in this condition, even with the help of the most perfect optical apparatus that complete success can be expected.***

ADDITIONS.

When the varnished plate is removed in order to be dried, care must be taken not only to preserve it from all damp, but also from all contact with light.

In mentioning the experiments made by means of *diffused*

* The observations that may be made on these experiments cannot be applied to the results obtained in the camera obscura. The effects of light passing through an engraving (especially when varnished) in contact with the sensible body, differ from those which give rise to the reproduction of the image in the camera obscura.

** The attempt which gave rise to this assertion was for a long time exposed to the action of light in the camera obscura, and, although Mr. Niepce speaks here of iodine to blacken, and of acid to engrave it, supposing it to be on copper, those two operations would have produced no gradation of tints. In fact, the image being obtained by the greater or smaller thickness of the varnish, according to its being more or less attacked by the light, it is impossible that the acid should act in the same manner on the metal. Moreover, Mr. Niepce never made any engraving from any proof obtained in the camera obscura.

*** The best optical apparatus cannot remedy the obstacle indicated in the preceding note.

light I have said nothing respecting that experiment on glass. I will make up for the omission in mentioning an improvement which is peculiar to it. This consists simply in placing under the glass plate a black paper, and interposing a pasteboard frame between the plate, on the varnished side, and the engraving which must have been previously glued to the frame so as to be well stretched. The result of this is, that the image appears much more apparent than it could on a white ground, and this cannot do otherwise than contribute to the rapidity of the effects; and secondly, that the varnish does not run the risk of being damaged through an immediate contact with the engravings, as in the other process, an inconvenience which it is no easy matter to avoid in warm weather, even should the varnish be very dry.

But this inconvenience is fully compensated by the advantage possessed by the proofs on plated silver of resisting washing, whereas it seldom occurs that this operation does not injure in some measure the proofs on glass, a substance which does not offer so much adherence to the varnish on account of its nature and superior smoothness. In order to remedy this imperfection it became requisite to give a greater degree of *mordant* to the varnish, and I think I have succeeded, if one can judge of such a thing after a few recent experiments. This new varnish consists of *a solution of bitumen judaicum in Dippel's animal oil*, which is evaporated by exposure to atmospherical temperature till it attains the consistency required. It is more unctuous, more tenacious and more coloured than the other, and after application, can be submitted immediately to the impressions of the luminous fluid which seems to render it solid more rapidly, because the great volatility of the animal oil causes it to dry much sooner.***

* This method still diminishes the resources of the process with respect to the lights of the proofs.

Done double, the 5th December, 1829.

Signed J. N. Niepce.

MODIFICATIONS

INTRODUCED TO THE PROCESS OF MR. NIEPCE

BY DAGUERRE.

The best substance to be employed is the residue obtained by evaporation from essential oil of lavender, laid on in a very thin layer, by means of its dissolution in alcohol.

Although all resinous or bituminous substances possess the same property, viz, that of being sensible to light, preference should be given to the most unctuous because they fix the proof much better; several essential oils lose that quality when exposed to a strong heat.

It is not however on account of its rapid decomposition on being exposed to light that the residue of oil of lavender is to be preferred; there are some resins, barras, for instance, which when dissolved in alcohol and spread on glass or on a metallic plate, leave, after the alcohol is evaporated, a very white layer far more sensible to the radiation which effects that decomposition. But this greater sensibility to light, caused by an evaporation of shorter duration, renders the images thus obtained more susceptible of being damaged; they become flaky and after a few months' exposure to the sun disappear entirely. The residue of essential oil of lavender presents more fixedity, without being unalterable by the direct action of the sun.

To obtain this residue, the essence must undergo evaporation in a capsule, by heat, till the residue acquire such a degree of consistency as to sound, when cold, on being struck with

the point of a knife and to break in bits when taken from the capsule. A small portion of this substance is then dissolved in alcohol or in acetic ether ; the solution must be very clear and lemon-coloured. The clearer the solution is, the thinner the layer obtained ; nevertheless it must not be too clear ; else it would not become dull nor make a white layer, which is indispensable for obtaining effect in the proofs. Alcohol or ether is employed for the sole purpose of facilitating the application of the residue in a very divided form, since the alcohol will have entirely evaporated before the operation begins.

To obtain more vigour the metal must be embrowned ; the proofs on glass are prettier and much more delicate. Previous to commencing, it is essential that the metal or glass be thoroughly cleared ; to do this, alcohol and very fine tripoli may be used, but this operation must always be terminated by dry-rubbing to prevent any liquid from remaining ; cotton should be employed with the alcohol and the tripoli, which should be excessively fine so as not to scratch either the metal or glass.

To put on the layer, the metallic plate or glass should be held in one hand, while the other pours out from above the solution (which should be contained in a wide-mouthed phial), so as in flowing to cover rapidly the whole surface of the plate. At first, the plate should be held sloping ; but as soon as the solution has been poured on, and it has ceased flowing, it must be placed perpendicularly. The finger is then passed behind the plate, as well as at the bottom to carry off a part of the liquid, which, as it tends to ascend, would otherwise increase the thickness of the layer. When the liquid has done running, the plate must be placed in the shade to dry, for otherwise the sensibility of the substance would be destroyed by the action of the light.

The layer is now white and extremely thin ; it is to this last circumstance that the more or less rapidity is partly due. This preparation should be made in a weak light, or what is still better by the light of a wax candle which has no action on the substance in question.

When the layer is quite dry, the plate may be introduced into the camera obscura. Here it is left the time necessary for the reproduction of the image, and this time cannot be limited for it depends on the more or less great intensity of light spread over the objects of which the image is to be fixed. However it takes no less than seven or eight hours for a view, and about three hours for objects on which the sun reflects with great intensity, and which are of themselves of a bright colour. These data however are calculated only as near as possible, for they must of course undergo great modification, according to the variation of the seasons and the time of day. (See what has already been said on this subject page 70).

When the operation is performed on glass, it is necessary, in order to increase the light, to lay it on a sheet of paper; but, to prevent this reflection from being confused, the side of the layer should be placed in a direct position on the paper, which it should be made to touch on the entire of its suface. To effect this, the paper should be stretched on a board planed very evenly; the glass should be chosen as white as possible.

When the proof shall have been left a sufficient time in the camera obscura, it should be withdrawn, but great care should be taken to preserve it from the light.

As it frequently happens that when the proof is taken from the camera obscura, not the slightest trace of an image will be perceptible, a process must be adopted to render it apparent.

This process is as follows:—take a tinned copper vessel or a tin one, larger than the sheet of metal, and lined around with an edge of about fifty *millimètres* high. Fill this vessel with oil of petrol to about a quarter of the brim; then fix the sheet of metal in a small board, but large enough to cover the vessel. The oil of petrol, in evaporating, completely penetrates the substance wherever the action of the light has not taken effect, and gives it such a remarkable transparency, that there seems nothing left in these spots; those places on which, on the contrary, the light has taken most effect, are in no way influenced by the vapour of the oil of petrol.

It is in this manner that the gradation of tints is effected, by the more or less action of the vapour of the oil on the substance.

The proof should be carefully watched and withdrawn from the oil as soon as the first tints are perceived; for if the operation of evaporation were carried to too great an extent, the lights would be affected by it, and might thereby disappear completely. The operation is then terminated. The proof obtained must be put in a glass-case to prevent dust settling upon it, and to take the dust off, no other method should be employed than blowing it with the mouth. By placing the proofs under a glass, the silver plate is also preserved from the effects of the vapour which might tarnish it.

SUMMARY.

Every kind of bitumen, and residue of oil, as we have already said, is liable to decomposition by the effect of light; for this it is requisite only to put them in very thin layers, and to find a dissolvent which suits them. For this purpose, oil of petrol, and all essential oils, alcohol, ethers, and caloric may be used.

Mr. Niepce used to immerge the plate covered with a varnish of bitumen, in a liquid dissolvent; but such a method is rarely consistent with the small degree of intensity of light which the proofs have obtained in the camera obscura.

The dissolvent is always either too strong or too weak. In the former case, it completely destroys the varnish, and in the latter, it does not render the image sufficiently apparent.

The effect of the dissolvent, in which the image is immerged, is to take away the varnish in those places on which the light has not acted, or else, according to the nature of the dissolvent, the contrary effect will be obtained, that is to say that the parts on which the light will have acted, are destroyed, whilst the others remain untouched. This is precisely what always occurs when alcohol is used instead of petrol or essential oil.

Dissolvents by evaporation or by the effect of heat are far

preferable ; the effects can always be stopped when required. But it is essential that the layer be not put on like a varnish ; it must be a dead-white and as white as possible. The vapour of the dissolvent only affects the layer and destroys the dull part, according to the more or less intensity of the light. This mode of proceeding gives a gradation of colours which it is quite impossible to obtain by immerging the proof in a dissolvent.

A great number of experiments made by the author have proved to him that light cannot fall on any peculiar body without leaving traces of decomposition on the surface of that body ; but the same experiments have demonstrated that these same bodies may be recomposed in a great measure when placed in the shade, unless indeed the light has occasioned a complete decomposition.

A conviction of this fact may be easily obtained, by the process above described, by arranging two plates exactly similar and preparing them alike, and then exposing them to the light with effects of shade. When it is supposed that the light has acted, the two plates must be withdrawn, and one should be immediately submitted to the experiment of the dissolvent, and the other kept confined in a box several days and then exposed like the first to the effect of the dissolvent. It will then be seen that the result obtained on the second plate is in no way similar to that obtained on the first.

It may be concluded from this fact that a great quantity of bodies, and more particularly varnishes, would be much more liable to decomposition, were it not for that property which they possess, of recomposing in the shade.

AN

HISTORICAL ACCOUNT

OF THE PROCESS

OF THE DAGUERREOTYPE

NOTES RELATIVE TO THE DAGUERREOTYPE.

It will have been seen in the preface of the description of the process of Mr. Niepce, that a deed of provisional association was passed between that person and Mr. Daguerre, in the month of December, 1829. In this deed, Mr. Daguerre bound himself to bring to a state of perfection the process invented by Mr. Niepce, and to furnish him with all the particulars relative to the improvements which he had made connected with the camera obscura. Mr. Daguerre has thought proper to publish here part of his correspondence with Mr. Niepce, to prove that the latter was in no way connected with the invention of the Daguerreotype.

In fact, it will be seen, from the correspondence of Mr. Niepce, that Mr. Daguerre pointed out to him the effects produced by light on iodine when connected with silver, in a letter dated 21st of May, 1831, the receipt of which was acknowledged on the 24th of June following. In this said letter Mr. Daguerre advised Mr. Niepce to try this new method; Mr. Niepce followed the advice on several occasions, and always at the instigation of Mr. Daguerre. But Mr. Niepce's experiments in this matter had always proved unsuccessful; he regretted even his loss of time, and finally gave it up, deeming the process impossible. At this period, it is true, the two most important problems remained to be solved; the first to obtain lights in their *natural state;* the second to find the means *of fixing the images.* These two problems have since been satisfactorily solved by Mr. Daguerre, and by the use of mercury.

Mr. Niepce died July 5th, 1833. On 13th June, 1837, a final deed was passed between Mr. Daguerre and Mr. Isidore Niepce, the son and heir of Mr. Joseph Nicephore Niepce, in virtue of which deed Mr. Isidore Niepce acknowledges that Mr. Daguerre showed him his new process. It is also specified in this deed, that the process shall bear the *name alone* of Mr. Daguerre, as being in fact the sole inventor of it.

Extracts of the letters of Mr. Niepce, the father, to Mr. Daguerre.

Saint-Loup-de-Varennes, 24th June, 1831.

Sir, and dear Partner,

I had long expected to hear from you and too impatiently not to receive, and peruse with great pleasure, your favours of 10th and 21st of *May last*. I will, for the present, only reply to that of the 21st, because, having, as soon as the letter reached me, made experiments connected with *your discoveries relative to iodine*, I feel anxious to communicate the result of those experiments. I had already made similar experiments before I had the pleasure of your anquaintance, but without hope of success, on account of the impossiblity, in my opinion, to fix, in a durable manner, the images received, even if it were possible to replace the shades in their natural order. The result of my experiments, in this respect, had been totally similar to that which I obtained from oxide of silver; and quickness in the effects was the only real advantage which either of the processes seemed to me to offer. However, sir, last year, shortly after your departure from hence, I submitted iodine to fresh experiments, but with another mode of application; I informed you of the results, and your reply, which was so little satisfactory, induced me to abandon all further

researches. It appears that since, you have considered the matter in a more favourable light, and I have therefore not hesitated to reply to the *appeal* which you now make to me.

Signed: J. N. Niepce.

Certified a correct copy,

Arago. Daguerre.

Saint-Loup-de-Varennes; 8th November, 1831.

Sir, and dear Partner.

In conformity with my letter of 24th June last, in reply to your esteemed favour of 21st May, I have now made a long series of experiments with *iodine* when applied to polished silver, but without, however, attaining the result that I had been led to anticipate. In vain did I vary my previous processes and combine them in different ways, my experiments were none the more successful. I have recognized, in fact, that it is impossible, in my opinion at least, to bring to its natural state the inverted order of tints, and particularly to obtain any thing further than a shadowy image of objects. However, Sir, this failure in every point in conformity with what my experimental researches with metallic oxids had afforded me long ago, and which finally induced me to give up all idea of their being successful. My last trial, was to communicate iodine to the sheet of pewter; I had, at first, augured favourably of this result. I had remarked, with surprise, but once only, while operating in the camera obscura, that light acted inversely on iodine, so that the different tints, or, I would rather say, the lights and shades, were in their natural order. I know not how and wherefore this effect was produced without my ever being able to repeat it, by having recourse to the same process. But this mode of application, with respect to the fixity of the image obtained, would nevertheless have been defective. For this

reason, after several other attempts, did I give it up, greatly regretting, I must own, to have travelled the wrong road for so long a time, and what is worse still, so uselessly, etc.

Signed J. N. Niepce.

Certified a correct copy,

Arago. Daguerre.

Saint-Loup-de-Varennes, 29th January, 1832.

Sir, and dear Partner,

. . . . . To the substances which, as you state in your letter, act on silver similarly to iodine, you may add decoction of thlaspi, emanations of phosphorus, and particularly sulphures, for it is principally to their presence in these bodies, that must be attributed the similarity of the results obtained. I have also observed that caloric produces the same effect by oxydation of the metal from whence proceeds, at any rate, the great liabilities to the effects of light; but this, unfortunately will in no way assist you in your solution of the question which now *occupies your attention.* For my part, I never use iodine now in my experiments, unless it be as a term of comparison of the relative promptitude of their respective results. Indeed, the weather has been so unfavourable for the last two months, that I have been scarcely able to do any thing. With respect *to iodine, I will request you, Sir, to tell me in the first place, in what manner you make use of it?** *Whether in a concrete form, or as a solution in a liquid?* Because in either case, evaporation

* (Note of Mr. Daguerre.) This sentence will, I trust, convince, even the most prejudiced, that it was really I who had indicated iodine, not as a method to blacken certain parts of a drawing *already made*, but as the effective coating on which the photogenous image was to be created.

will in all probability not act in the same way with respect to promptitude.

Signed J. N. NIEPCE.

Certified a true copy.

ARAGO. DAGUERRE.

Saint-Loup-de-Varennes, 3rd March, 1832.

MY DEAR PARTNER,

. . . . . Since my last, I have done little else, than try new experiments with iodine and without any satisfactory result. In fact, I was induced to resume these experiments from no other motive than because you seemed to attach *a certain importance thereto*, and because, on the other hand, I was anxious to account to myself for the effects of the application of iodine to the pewter sheet. But, I repeat to you, Sir, I do not see that there is any reason to *flatter ourselves that we shall ever be able to make any thing of this process*, no more than of those connected with the use of metallic oxyds.

Signed J. N. NIEPCE.

Certified a true copy.

ARAGO. DAGUERRE.

Extract of a letter of Mr. Isidore Niepce, who endeavoured to produce images according to the process of his father, brought to perfection by Mr. Daguerre.

Lux, 1st November, 1837.

MY DEAR DAGUERRE,

. . . . . You will doubtless, my dear friend, have been more fortunate than I, and your portfolio is, in all proba-

bility amply supplied with the most beautiful proofs! What a difference between the process which you employ, and the one with which I laboured!... Whilst it took me *nearly a whole day* to get a proof, you require only *four minutes* for the same. What an immense advantage!... It is so great, that most assuredly no one, who would be acquainted with the two processes, would ever employ the old process.

For this reason, I am less vexed at the little success I have obtained; because, although this process may be said to be the result of the labours of my father, to which you also contributed, it is certain that it cannot become the exclusive object of the subscription.* Therefore I think that it is very requisite to mention it, in order to make known the two processes, of which yours alone should be preferred!...

Signed Isidore Niepce.

Certified a true copy.

Arago. Daguerre.

* At that period they were thinking of publishing the process by subscription.

A PRACTICAL DESCRIPTION

OF THE PROCESS CALLED

THE DAGUERREOTYPE.

This process consists of the spontaneous reproduction of the images of nature reflected by means of the Camera Obscura, not in their own colours, but with a remarkable delicacy of gradation of tints,

By DAGUERRE,

Inventor of the Diorama, Officer of the Legion of Honour, and Member of several Academies.

THE DAGUERREOTYPE.

A DESCRIPTION OF THE PROCESS.

The drawings are made on sheets of silver plated on copper. Although the copper serves principally to support the sheet of silver, the combination of these two metals contributes sensibly to the perfection of the effect. The silver should be as pure as possible. With respect to the copper, it should be of sufficient thickness to maintain the planimetry of the plate, so that the images should not be deformed; but too much thickness should be avoided on account of the weight that would be added to the apparatus. The thickness of the two metals together should not exceed that of a thick card.

The processs is divided into five operations :

The first consists in polishing and cleaning the plate to render it fit to receive the matter on which the effect is to be produced.

The second, in applying that matter.

The third, in submitting to the camera obscura the plate prepared to receive the action of light, in order subsequently to receive the images reflected from nature.

The fourth, in rendering those images apparent, as they are invisible when taken from the camera obscura.

And the fifth consists in taking off the coating of matter on which the effect has been produced as it would continue to be modified by light, and would necessarily tend to destroy the drawing completely.

FIRST OPERATION.

The following are requisite for this operation.

A small phial of olive oil;

Some very fine carded cotton;

Pummice stone pounded extremely fine, and contained in a muslin bag sufficiently fine to allow of the passage of the powder when shaken;

A phial of nitric acid diluted in water in the proportion of one part (in volume) of acid, to sixteen parts (also in volume) of distilled water.

A wire frame, on which to lay the plates to warm them with a lamp of spirits of wine, and lastly a small spirits of wine lamp.

As we have already stated, the drawings are made upon plated silver. The size of the plate is proportioned to the size of the apparatus. The plate should be first well polished. For this purpose it should be well powdered with pummice stone (shaking it from the bag, without touching the plate) and, with cotton imbibed with a little olive oil, gently rubbed in a circular direction, as shown in figure 2, pl. 1. For this operation, the plates should be placed on a sheet of paper which should be occasionally renewed.

The pummice powder should be applied repeatedly, and the cotton renewed several times. (The mortar used to pulverise the pummice stone should be neither of cast-iron nor of copper, but of porphyry. The stone should then be pounded on a piece of unpolished glass with a glass pestle and very limpid water. The pummice powder should not be used until perfectly dry). It will be readily conceived how important it is that the pummice should be fine enough not to scratch, as it is on the perfect polish of the plate that principally depend the beauty and clearness of the proof. When the plate is well polished it should be freed of any greasy substance, which is done by powdering it with pummice, and rubbing it dry with cotton, always with a circular motion. (It will be possible to obtain a good proof if it be

rubbed otherwise). A small cotton stump should then be made and imbibed in a small quantity of acid diluted with water (as is stated above); for this, the cotton stump should be applied to the neck of the phial, and the phial turned upside down, and slightly pressed on the cotton, so that the middle of the cotton only imbibe the acid, without it being soaked; a very small quantity will be requisite, and the operator should avoid wetting his fingers with it. The plate should then be rubbed with the stump, and the acid carefully spread on the whole surface of the plate. The cotton should be changed and the friction should always be made with a circular motion, in order that the acid liniment should be well spread, although it should only, as it were, graze the surface of the plate. The acid spread on the surface of the plate may divide into globules; in that case, they will easily be got rid of by renewing the cotton and rubbing so as to spread the acid all over, for the places where it might not have taken would be spotted. The acid will be ascertained to be spread over every part of the plate when its entire surface be covered all over in one smooth sheet. The plate should then be powdered with pummice, and slightly rubbed with cotton, that has not yet been used.

The plate should then be submitted to a powerful heat. And for this, it should be placed on the wire frame, *fig.* 1. and 1 *bis*, *plate* 1., the silver uppermost, and the spirit of wine burner be passed to and fro gently under it, so as to let the flame break upon it. When the lamp shall have been passed to and fro, during five minutes at least, under every part of the plate, a small coat of whitish matter will form on the surface of the silver; the heating should then be stopped. The heat of the lamp may be replaced by that of a charcoal furnace, which is even preferable, because the operation is sooner performed. In the latter case, the wire frame will be useless; because the plate may be placed on a pair of tongs, the silver uppermost, and be passed to and fro over the furnace, until it be well heated throughout, as directed above. It may then be quickly cooled by placing it on a cold body, such as a marble table for instance. As soon as it is cool, it should be polished afresh; which will easily be done, as it will only be requisite to destroy the small white substance which will have formed. For this,

the plate should be powdered with pummice and afterwards rubbed with dry cotton. The pummice-bag should be replenished several times and the cotton continually renewed.

When the silver shall have attained a high polish, it should be rubbed, as stated above, with acid diluted with water, and be powdered with a small quantity of pummice, rubbed on with a cotton stump. The acid should be applied three different times, and the plate be carefully powdered each time with pummice, and quickly rubbed dry with very clean cotton, taking care that the portion of the cotton which has been held in the fingers does not touch the plate, because the perspiration will stain the drawing. The steam of the breath should also be kept carefully from the plate, as also spots of spittle.

If it be not intended to operate immediately, the acid should not be applied more than twice after the operation of heating, which will allow of the preparations being made beforehand; but previous to making a drawing, (and this is indispensable,) apply the acid at least once, and powder lightly with pummice as directed above. The pummice dust should be carefully taken from the surface and edges of the plate with a little clear cotton.

SECOND OPERATION.

This operation requires :—

The box as described in *plate* 2, *fig.* 1 and 2;

The board described in *plate* 1, *fig.* 3;

Four small metallic bands, of the same substance as the plates;

A small hammer and a box of small nails;

A phial of Iodine.

Having fixed the plate on the board by means of the metallic bands and small nails which should be driven in with the small hammer provided for that purpose, as described in *plate* 1, *fig.* 3, the capsule at the bottom of the box should be filled with iodine. The latter ingredient should be divided in the capsule, so that the focus of emanation be more powerful; otherwise, small rainbows would form in the middle of the plate, which

Fig. 1

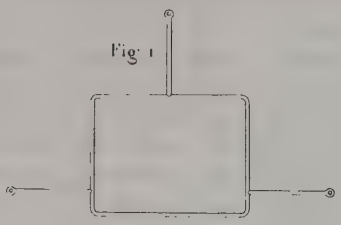


Fig. 1. bis.

Fig. 2.

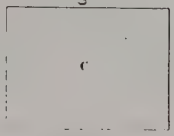
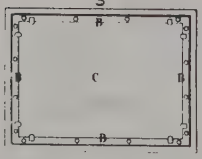


Fig. 2 bis.

Fig. 3.



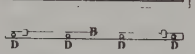


Fig. 3. bis.

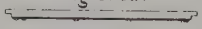


Fig. 4.

Fig. 6.

Fig. 5.

Fig: 1.

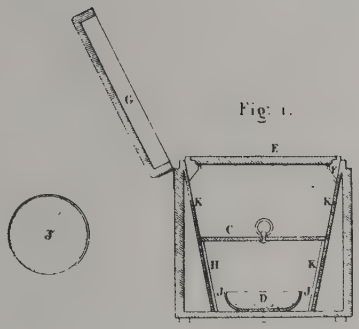


Fig: 2.

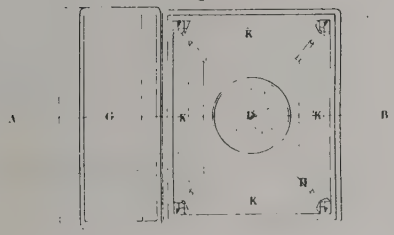
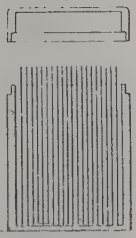


Fig: 3.



Mètre

would prevent the iodine from spreading equally all over. The board should then be placed, the metal undermost, on the small gussets placed at the four angles of the box, the lid of which should then be closed. It should be left thus until the surface of the silver shall have turned a bright golden yellow colour. If the plate be left too long, this bright yellow will turn to violet, which should be avoided, because then the light will not have such a powerful effect upon it. If on the contrary the yellow were not sufficiently bright, the image of nature would be with more difficulty reflected. Therefore, the golden yellow should be brought to its proper tint, because it is the only one which will prove favourable to the operation. The proper time for performing this operation cannot be determined, because it depends on various circumstances. In the first place, on the temperature of the room, because this operation should always be left to itself, that is to say, that it should take place without the addition of any other heat, than that which might be given to the room, in which the operation is being performed, and which might be felt too cold. One thing in particular is important to be considered in this operation, and that is, that the temperature inside the box should be equal to that without; if it were otherwise, the plate, passing from heat to cold, would be covered immediately with damp, which would prove very prejudicial to the beauty of the picture. Another thing, equally important, is that the more the box is used, the less time should be required, because the vapour of the iodine penetrates the wood in the inside, and this vapour always tends to disengage itself; by disengaging itself from every part of the inside, this vapour spreads much more evenly and quickly on the surface of the plate, which it is very important that it should do. For this reason, the operator will do well to leave a small quantity of iodine in the capsule at the bottom of the box, and to preserve the latter from damp. It is obvious therefore that the box is preferable, when it has been used for some time, because the operation will be more quickly effected.

As, for the reasons above stated, it is not possible to fix the exact time which will be requisite to obtain the fine golden yellow colour for the operation (the time may vary from five to

thirty minutes, but scarcely ever more, unless the weather be extremely cold,) it is obvious that the operator should occasionally examine the plate, to ascertain whether it has attained the requisite brightness of colour; but he should take care not to let the light strike upon it. It may happen that the plate will be coloured more deeply on one side than on the other; in this case, in order that the colour be the same all over, in placing the board on the box, it should not be turned over, but end for end. The box should be placed in a dark room, the light entering only through the aperture of the door, which should be left partially open, and when the operator wants to examine the plate, after having uncovered the box, he should take up the plate by the two ends, and with both hands, and turn it quickly over; the plate need, then, only reflect a certain portion which is well lighted, but as distant as possible, to enable him to tell whether the colour be sufficiently dark. The plate should be quickly replaced in the box, if the colour has not attained the required tint; if, on the contrary, the tint happens to be too dark, the plate thus prepared would be of no use, and the first operation must be recommenced.

From the above description, this operation may appear difficult, but with a little practice it is easy to guess the time it will require for the plate to attain the required colour, and also to examine the plate quickly, so as not to allow the light to act upon it.

When the plate has attained the necessary shade of ellow, the board should be affixed within the stand, *plate* 3, *fig.* 4, which is adapted to the camera obscura. The light should be carefully kept from the board; the operator may use a wax taper, the light of which is far less powerful; this light even should not be allowed to strike too long upon the plate, for it would affect it.

The next operation to be performed is that in the camera obscura. The operator should, as much as possible, endeavour to pass immediately from the second to the third operation, or not to leave more than an hour's interval between the two; beyond that time, the combination of the iodine with the silver has no longer the same properties.

Fig. 1

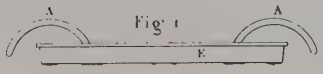


Fig. 2

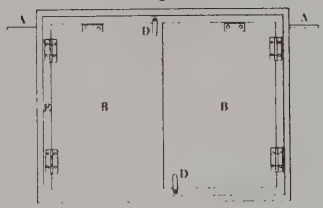


Fig. 3.

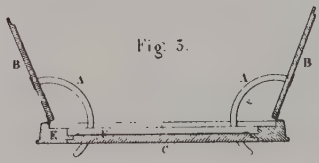


Fig. 4

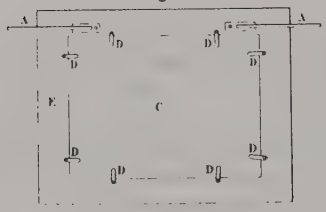


Fig 1.

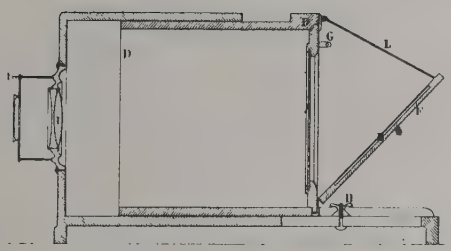
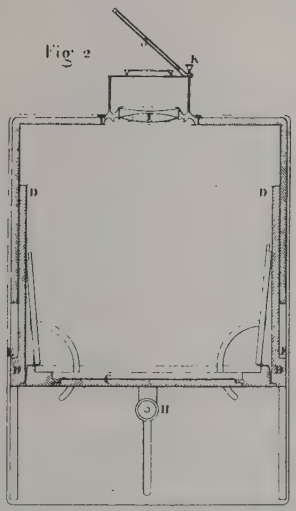


Fig 2



Observations.

Before the box is used, the inside should be carefully wiped, and the box turned over, to throw out all the small particles of iodine which may have fallen from the capsule, carefully avoiding to touch the iodine, which will soil the fingers. The capsule should be covered over with a gauze stretched on a ring; the object of this gauze is to regulate the evaporation of the iodine, and at the same time to prevent, when the lid of the box is closed, the pressure of the air, which it occasions, from blowing particles of the iodine on the plate, which would be strongly stained by them. It is for this reason that the box should always be closed gently, in order that no dust, which might be impregnated with the vapour of the iodine, be blown about in the inside.

THIRD OPERATION.

The only apparatus requisite for this operation is the camera obscura. See *plate* 4, *fig.* 1 and 2.

The third operation is that which takes place on nature itself, with the assistance of the camera obscura. As much as possible, objects in the sun should be selected, because the operation will be more quickly performed. It will be readily conceived that in this operation, arising only from the effect of the light, the action of the latter is the more promptly obtained, as the objects are more powerfully struck upon by the light and are more white of their own nature.

Having placed the camera obscura opposite the point of view, or the objects whatever they may be, of which the operator may wish to fix the image, the essential point is to fix the focus properly, that is to say, so that the objects be reflected with the greatest nicety, which is easily obtained by approaching or removing the frame of unpolished glass which receives the natural image. When great preciseness has been attained, the moveable part of the camera obscura

is fixed by means of the screw for that purpose; the frame of glass is then removed, taking great care not to disturb the camera obscura, and in its place is put the apparatus containing the plate, and which exactly fits the place of the frame. When this apparatus is properly fastened by the little copper tourniquets, the opening of the camera obscura is closed, and the internal doors of the apparatus are then opened by means of the two semi-circles. The plate is now ready to receive the impression of the view or the object selected. Nothing now remains to be done but to open the diaphragm of the camera obscura, and to consult a watch to reckon the minutes.

This is a very delicate operation, because nothing is visible, and it is quite impossible to know the time requisite for reproduction, since it depends entirely on the intensity of the light on the objects that are to be reproduced; this time in Paris may vary from 3 to 30 minutes at most.

It is also to be remarked that the seasons, as well as the hour of the day, have their influence on the length of the operation. The most favourable time is between 7 and 3 o'clock; and the result, acquired in June and July, in 3 or 4 minutes, will require 5 or 6 minutes in May and August, 7 or 8 in April and September, and so on in proportion as we enter into the winter season. This is but a general *aperçu* for objects in a favourable light, for it sometimes happens that 20 minutes are but sufficient in the most favourable months, when the objects are nearly in the shade.

From what has just been said, it is easy to see that it is not possible to announce the exact time requisite to obtain proofs; but with a little practice this can easily be calculated. In the south of France, and generally in all countries where light is very intense, as in Spain, Italy, etc., the proofs will require less time. It is also matter of importance not to exceed the time necessary for reproduction, as the lights would cease to be white, and would be blackened by the action of the light if too much prolonged. If, on the contrary, sufficient time were not given, the proof would be very imperfect.

Fig. 1

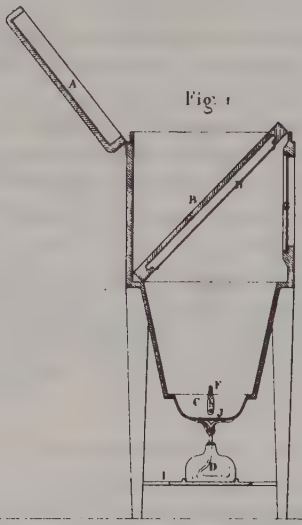


Fig. 2.

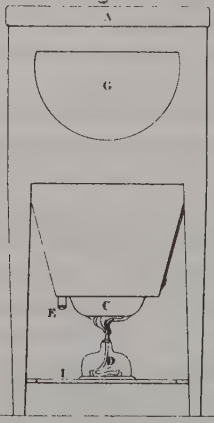
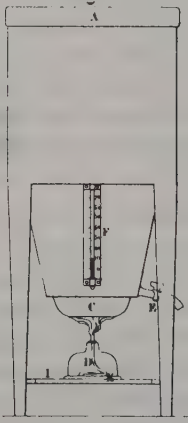


Fig. 3.



Should the first proof not succeed, owing to its remaining too long or being withdrawn too soon, another can be commenced immediately, and then the operator will be more certain of success; it is even useful to renew the proofs, in order to acquire certain skill.

The advice given for the layer is also applicable here. You must hasten to submit the proof as soon as it leaves the camera obscura to the 4th operation. There must not be more than an hour's interval, and success is much more certain when the operation is commenced immediately.

FOURTH OPERATION.

The requisites for this operation are:—

A bottle containing at least two pounds of mercury;

A lamp with spirits of wine;

The apparatus as in *plate* 5th, *fig.* 1, 2, and 3;

A long-necked glass funnel.

The mercury is to be poured through the funnel into the capsule which is at the bottom of the apparatus, in sufficient quantity to cover the ball of the thermometer. This will take about two pounds, and when this has been done no other light must be used than a wax-candle.

You must now withdraw the small plank on which is fixed the plate of the apparatus, *plate* 3, *fig.* 4, which preserves it from coming into contact with the light, and this small plank is placed between the grooves of the black plank, *plate* 5, *fig.* 1; the black plank is then replaced in the apparatus on the wedges which keep the metal underneath, sloping in an angle of 45 degrees, so that it can be seen through the glass; the cover of the apparatus is then closed very gently to prevent the pressure of the air from raising up any part of the mercury.

When everything is arranged thus, it is necessary to light the lamp, to place it under the capsule containing the mercury, and to keep it there till the thermometer, the ball of which is

in the mercury, indicates a heat of 60 degrees centigrade, when the lamp must be removed; if the thermometer has risen rapidly it will continue to ascend without the aid of a lamp, but it must not be allowed to exceed 75 degrees.

The imprint of the natural image exists on the plate, but it is not visible,—some minutes pass before it begins to appear, and this can be ascertained by looking through the glass by means of the wax light, but you must avoid doing this for any length of time, or it would otherwise leave traces on the plate. The proof must be left till the thermometer has descended to 45 degrees; it is then to be withdrawn and this operation is over.

When the objects have been placed in a strong light, and the light has been allowed to act too long in the camera obscura, this operation is terminated before the thermometer descends to 45 degrees; this can be ascertained by looking through the glass.

After every operation, it is essential to wipe thoroughly the interior of the apparatus, to remove the small layer of mercury which is generally to be found there. The black plank must also be well wiped, so that no mercury remain there. When the apparatus has to be packed up in order to go any distance, the mercury in the capsule should be replaced in the bottle, which is done by sloping the box to make it run out by the little cock placed for that purpose.

The proof may now be examined in a weak light, to ascertain whether success has been complete. It is removed from the little plank by taking off the four small metallic bands, which must be carefully cleaned with pummice-stone and water after every proof. The necessity of this arises, not only from their having been covered with a layer of iodine, but from their having also received the image. The plate is then placed in the box with grooves, *plate* 2, *fig.* 3, until it undergoes the 5th and last operation, which need not take place immediately, for the proof can be preserved without any alteration whatever for several months, provided it be not looked at too often and exposed to broad day-light.

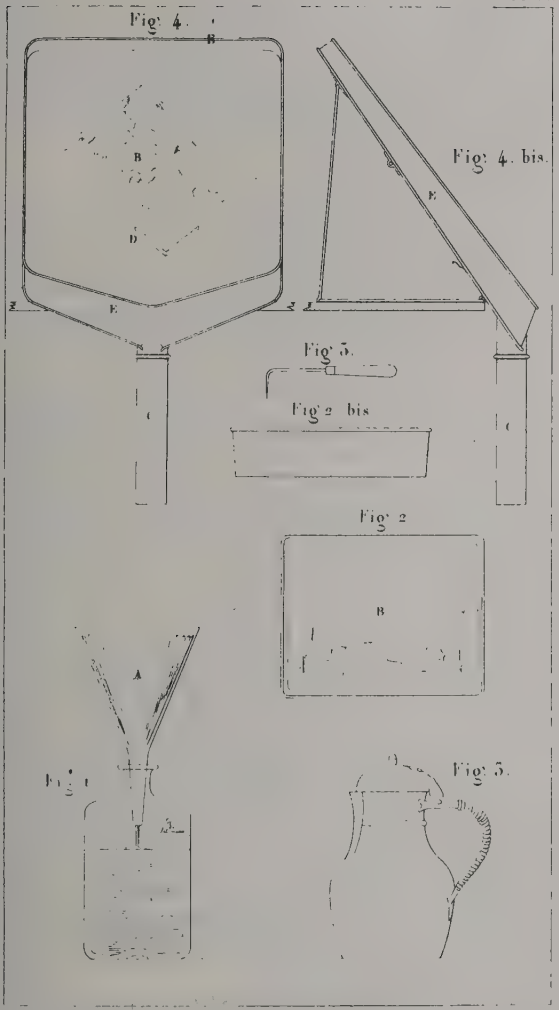


Fig. 4.
B
B
D
E
Fig. 4. bis.
E
Fig. 3.
Fig. 2 bis
Fig. 2
B
A
Fig. 1
Fig. 5.

FIFTH OPERATION.

The fifth operation is for the purpose of removing from the plate the iodine, which otherwise, on the proof being exposed to light for too long a period, would undergo decomposition and destroy it.

This operation requires :—

Water saturated with common salt, or a weak solution of the hyposulphite of pure soda ;

The apparatus described *plate* 6, *figs.* 4 and 4 bis ;

Two copper pans tinned, *plate* 6, *figs.* 2 and 2 bis ;

A kettle of distilled water, *plate* 6, *fig.* 4.

To remove the layer of iodine, fill a large wide-mouthed bottle one-fourth part with common salt, and then fill it up with clear water. Shake the bottle now and then to make the salt dissolve. When the water is completely saturated, filter it through blotting-paper, to make it perfectly clear and limpid. To avoid making this liquid every time, a large quantity can be made at once—it will keep good in bottles well-corked.

Pour some salt water into one of the pans until it be about three centimetres deep, and fill the other pan with clean common water. Make both of these hot, but do not allow them to boil. Instead of the solution of common salt, the hyposulphite of pure soda can be employed, and this last solution is better than the preceding one, because it removes the iodine immediately, a result which does not always occur with the solution of common salt, especially when the proofs are of some standing. The operation is the same for both solutions : the hyposulphite does not require being warmed, and a smaller quantity will do, as it is necessary only that it should cover the plate at the bottom of the pan.

Dip the plate first into the pan containing common water; do not cease holding it, and take it out immediately, for it is merely requisite that the surface of the plate be made wet ;

and then, before it can dry at all, dip it in the salt water. If the plate were not dipped in common water previously to its being dipped in the salt water or the hyposulphite solution, indelible spots would be made. To facilitate the action of the salt water, or of the hyposulphite, on the iodine, the plate must be shaken, without being taken out of the liquid, by means of the tinned copper hook, (*Plate* 6, *Fig* 3,) which is passed underneath the plate, which is to be raised and lowered several times. When the yellow colour has entirely disappeared, the plate is removed, and it is to be taken by the two extremities by pressing the hands against the thicknesses (to prevent the fingers touching the proofs) and dipped immediately into the first pan of clean water.

Then take the apparatus (*Plate* 6, *Fig. 4 and 4 bis*) and the kettle, (*Plate* 6, *Fig.* 5), which must be quite clean and have had some distilled water boiled in it. Remove the plate from the pan of water and place it immediately on the sloping board, (*Plate* 6, *Fig. 4*); and then, without allowing it to dry, pour on the surface, and by the top of the plate, the distilled water, very hot, but not boiling, so that the water may fall like a sheet on the whole extent of the proof, and carry off with it the whole solution of common salt or of hyposulphite, which is already weakened by the immersion of the plate in the first pan.*

A quart of distilled water, at least, is requisite for a proof of the size indicated. It seldom occurs that after pouring this quantity of hot water on the proof, any drops remain on the plate. Should this, however, take place, these drops must be removed before they have had time to dry, for they might contain some particles of common salt and even of iodine; to remove them one need but blow with the mouth strongly on the plate.

It is easy to conceive the importance of employing clean water for this washing, for, if in drying on the surface of the

* If hyposulphite be employed, the distilled water must not be poured out so hot as with the common salt.

plate, notwithstanding the rapidity with which it may have run off, the water happened to contain any substance in dissolution, numerous indelible spots would appear in the proof. To ascertain whether the water be fit for this washing, pour a drop on an unbrowned plate, and, if no residue remain on its being made to evaporate by means of heat, it can be employed without danger. Distilled water leaves no trace.

After this washing, the proof is finished, and nothing remains to be done but to preserve it from dust and the vapour that might tarnish the silver. The mercury which sketches the images is in part decomposed ; it sticks to the silver and withstands the water poured on it, but cannot bear any rubbing.

To preserve the proofs, they should be placed under glass and glued—this makes them unalterable, even if exposed to the sun.

As it is possible that in travelling the proofs cannot be framed, they can be preserved quite as well in a box like the one represented *Plate* 2, *Fig.* 3. To ensure their more perfect preservation, small strips of paper can be pasted over the joints of the cover.*

It is necessary to observe that the plate can serve several times,—in fact, so long as the copper does not appear. But it is highly essential that the mercury be removed each time, as before stated, by means of pummice-stone and oil, and by changing the cotton frequently ; for otherwise the mercury finishes by adhering to the silver, and the proofs obtained on this amalgam are always imperfect, being never vigorous or clear.

* The author attempted to preserve the proofs by means of different kinds of varnish made with succinum, copal, india-rubber, wax, and other resinous substances; but he remarked that, by the application of every kind of varnish, the lights of the proofs became considerably attenuated, and, at the same time, the vigorous tones became misty. Moreover, the mercury became decomposed by its combining with the varnish: this effect, which did not become apparent for two or three months, at length destroyed the image. Besides, the fact of these destroying the intenseness of the lights was not sufficient cause for the author to give up employing them, as the most desirable improvement in the process, on the contrary, is to increase that intenseness.

EXPLANATION OF THE PLATES

OF

THE DAGUERREOTYPE.

PLATE I.

Fig. 1. Represents a wire frame, seen from underneath.

Fig. 1 (bis). Shows the same object, seen in its elevation; this frame is used for holding the plates to be heated by the spirits of wine burner, B. *Fig.* 6.

A. a stopper to prevent the spirits of wine evaporating when the lamp be not in actual use.

Fig. 2. Sheet of plated silver, in which the drawing is made; its size is two hundred and sixteen millimetres by a hundred and sixty-four millimetres. To take drawings of larger dimensions, the focus of the reflector should not only be increased in size, but also every part of the different apparatus.

Fig. 2. (bis). Thickness of the plate: the latter may be thin, the essential point is that it be completely smooth.

Fig. 3. Board on which is fixed the plate fastened by four small bands B, in plated silver, of the same thickness as the plate; these bands are fastened with a few small nails, which are driven into the holes D, with a small hammer, *Fig* 5.

The bands being on a level with the plate, retain it only by little projections soldered to it; these small metallic bands are principally intended to smooth the coat of iodine which, without them, would be far thicker on the edges than in the middle of the plate.

Fig. 3. (bis.) The same board seen in its thickness.

Fig. 4. The muslin stump containing the pummice powder.

N. B. The scale at the bottom of Plate II. serves for all the others.

PLATE II.

Fig. 1. Represents, according to the line AB, a section of the box which is used to obtain the coat of iodine on the sheets of plated silver.

Fig. 2. Represents the same box seen from above.

C. The small lid which closes hermetically the lower part of the box; it is used, when no operation is being performed, to concentrate the evaporation of the iodine, which makes its way into the wood in that part of the box, and which continually tends to disengage itself therefrom.

D. The capsule in which the iodine is deposited.

E. The board with the plate upon it, as is described in Plate 1, *Fig.* 3: it is placed, in order that the coating be obtained, on the four gussets F, which are at the four angles of the box, the lid C must for that purpose be removed.

G. The lid of the box, which has to be kept continually closed.

H. Small rods at the four corners of the funnel of the box, to support the lid C.

J. A hoop with gauze, which is placed over the capsule to regulate the vapour of the iodine; it also serves to prevent, if the box be closed too quick, the pressure of the air from blowing out of the capsule any particles of iodine, which might stick to the plate and stain the drawing.

K. A wooden frame, forming in the inside, a second box, in the shape of a funnel.

Fig. 3. Represents a box and its lid, in which the sheets of plated silver are enclosed, before and after the drawings are made; they fit into small grooves on each side, so that they should not rub against each other, and be at the same time preserved from dust. By pasting paper bands on the joints of the lid, the drawings will be preserved from vapour, but this precaution need only be taken with the drawings that are nearly finished, and in case the box should not close hermetically.

PLATE III.

Plate 3 represents four positions of the frame which is used to hold the board with the plate, to guard it against the light as soon as it receives the coat of iodine in the box, Plate II.

A. Semi-circles, which are used to open the door B.

C. The board with the plate.

D. Bolts to fasten the board and the doors.

E. The thickness of the stand.

F. The plate for the drawing.

Fig. 3. Represents the stand, with the doors open, as they are when a drawing is being made in the camera obscura.

PLATE IV.

Fig. 1. Represents a perpendicular section in the length of the camera obscura, with the frame containing an unpolished glass A, of which the distance from the object is exactly the same as that which should be given to the plate on the frame with doors, as will be seen in C. *Fig.* 2.

B. Is a mirror which is used to rectify the objects. To choose the views, it should be inclined in an angle of 45 degrees by means of the rod I; but in order to fix the focus with proper precision, the glass should be completely opened, and the operator should fix his eye on the objects described on the unpolished glass. These objects he will easily place on the focus by pushing forward or drawing back the double box D, taking hold of it at the bottom with both hands and by the two projections E, *Fig.* 2. When the focus is properly obtained, the button H should be turned to fix it; the glass should be closed —this is done with two small hooks F, which fit into the small bored plates G, and the frame should be put on one side to make room for that which holds the plate when prepared, which is represented in *Fig.* 2, with the doors open in the camera obscura. The doors should be lined in the inside with black

velvet, as well as the double box D, to protect it against the reflection of the light.

The object-glass should be an achromatical and periscopical one (the concave part should be outside the camera obscura), its diameter ought to be eighty-one millimetres, and its focus thirty-eight centimetres. A diaphragm is placed in front of the object-glass at a distance of about sixty-eight millimetres, and its aperture, which is closed by a plate with a bolt, is twenty-seven millimetres.

This camera obscura has the defect of transposing objects from right to left, which is of little or no consequence, whith a great number of objects; but if the operator is desirous of obtaining a view according to nature, a parallel glass should be added in front of the aperture of the diaphragm; it is placed as J. *Fig.* 2, and fixed by means of a screen K. But as this reflection occasions a loss of light, one-third more time should be reckoned upon to make the drawings.

PLATE V.

Plate 5 represents the same apparatus in three different points of view.

Fig. 1. A section of the apparatus.

Fig. 2. A front view of it.

Fig. 3. The same viewed from the side of the thermometer.

A. The lid of the apparatus.

B. A black board with grooves, to receive the board H. with the plate.

C. The capsule containing the mercury.

D. The lamp for spirits of wine.

E. A small cock introduced in one of the angles, and through which the mercury is drawn of by inclining the apparatus.

F. The thermometer.

G. A glass through which the drawings are viewed.

H. The board with the band and the drawing-plates.

I. A stand for the lamp which is affixed to the ring K, so that it should be exactly in the middle of the capsule.

The whole of the inside of the apparatus should be varnished black.

PLATE VI.

Fig. 1. Represents a funnel with a filter of grey paper to filter the water saturated with marine salt, or the solution of hyposulphite of soda.

Fig. 2. A tinned copper pan, at the bottom of which is described at B the drawing plate. Two similar pans are requisite, one for the salt water, and the other for the fresh.

Fig. 3. A small tinned hook of copper, which is used to lift the plate from the pans, to shake it, and draw it out more easily.

Fig. 4. Represents an apparatus in tin varnished, to wash the drawings, which are then placed under the square rule D.

E. Thickness to retain the water which runs from the pipe C.

Fig. 5. A kettle with a large spout to warm the distilled water, and pour it on the drawing when it is placed, as represented at B. *fig.* 4.

DESCRIPTION

OF THE

PROCESS OF PAINTING AND EFFECTS OF LIGHT

INVENTED BY DAGUERRE,

AND APPLIED BY HIM

TO THE PICTURES OF THE DIORAMA.

These processes have been principally developed in the pictures representing the *Midnight Mass,* the *Conflagration in the valley of Goldau,* the *Temple of Solomon*, and the *Cathedral of St. Mary at Montreal.* All these pictures have been represented with effects of day and night. To these effects, decomposition of forms are added, by means of which, in the *Midnight Mass,* for instance, figures appear where chairs were seen just before, or, in the *Valley of Goldau,* huge rocks rolling over the precipice replace the beautiful and picturesque aspect of the valley.

PROCESS OF PAINTING.

The canvas is painted on both sides. In this case, therefore, whether the subjects be illuminated by reflected or refracted light, one indispensable essential is, to employ a medium or canvas which is exceedingly transparent, and the texture of which is as equal as possibly can be obtained. Either lawn or calico may be used.

When the canvas thus selected is stretched, it is necessary to prime it, on both sides, with at least two coats of parchment size.

FIRST EFFECT.

The first effect, which ought to be the clearer of the two, is executed on the right side of the canvas. The sketch is first made in black lead, taking care not to sully the canvas, the whiteness of which is the sole resource possessed by the artist for bringing out the lights of the picture; for white cannot be used in executing the first effect. The colours employed are ground in oil, but laid upon the canvas with turpentine, to which sometimes is added a little animal-oil, but only for deep shadows, and these latter may be varnished without injury. The manipulation is exactly the same as in water-colour painting, with this difference only, that the colours are prepared with oil instead of gum, and applied with turpentine instead of water. It will readily occur to the artist that he can employ neither white nor any opaque colour whatsoever by coats, which in the second effect would occasion spots more or less tinted, according to the greater or less degree of opacity. It must be the endeavour of the artist to bring out effects at a stroke—at once; going over an effect injures the transparency of the canvas.

SECOND EFFECT.

The second effect is painted on the wrong side of the canvas. The artist in executing this part of his work must employ no other light than that which comes from the front of the picture through the canvas. By this means the transparent forms of the first effect are seen; these forms must either be preserved, or painted over, according to the effect intended.

First of all, a wash of some transparent blue is put over the whole canvas. This coating, like the other colours, is prepared in oil, and laid on in essence of turpentine. The marks of the brush are effaced by a huge tool of badger's skin. By means of this coating the seams also are concealed to a certain extent, by taking care to lay it on thin along the selvedges, which have always less transparency than the rest of the canvas.

When this coating is dry, the alterations intended to be made on the first effect are sketched out.

In executing this second effect, the artist has nothing to do beyond modelling in light and shadow, without reference to local colour or to the colours of the first picture, which are seen by transmitted light as transparencies. This part is executed by means of a tint of which white is the base, with which lamp-black is mixed in order to obtain a grey, the strength of which is ascertained by applying it to the wash of blue on the wrong side, and then viewing it from the right side of the picture, from which position it will not be at all perceptible if of the proper strength. The gradation of tones is produced by the greater or less opacity in this tint.

It may happen that the shadows of the first effect interfere with the execution of the second. To remedy this inconvenience, and to conceal these shadows, we can harmonize their force, by using the grey of a corresponding opacity according to the strength of the shadows which it is the intention to destroy.

It will occur to the artist, that it is necessary to urge this second effect to its utmost power.

When this general effect of light and shadow is finished on these principles, and the desired effect obtained, the picture may be coloured, the artist using only the most transparent tints prepared in oil. It is still a water-colour that is to be executed; but less turpentine must be used in these glazings, which produce a powerful effect only in proportion as they are repeated several times, and with more of oil than essence. However, for slight effects of colour, turpentine is sufficient.

EFFECTS OF LIGHT.

The first effect painted on the right or front of the canvas is lighted by reflection, that is to say, only by a light which comes from the front, while the second effect—that painted on the wrong side—receives its light by refraction; that is, from behind only. In both effects we may employ both lights at once, in order to modify certain portions of the picture.

The light which gives effect to the painting in front should come from above. The illumination which falls upon the second effect—that painted behind—should come from vertical openings, it being always understood that these are to be completely closed when the first effect only is to be seen.

If it happen to be necessary to modify a part in the first effect or picture by a light belonging to the second, that is, coming from behind, then this light must be inclosed so as not to fall, except on the proper place. The windows or openings ought to be distant from the paintings at least two metres (between 7 and 8 feet English), in order to give a power of modifying the light by transmitting it through coloured media, as the exigencies of desired effects may demand. The same means are requisite for the first effect or front picture.

The colours which appear on objects generally are produced only by the arrangement of the molecules of those objects. Consequently all those substances used in painting are colourless: they only possess the power of reflecting such or such a ray of light which in itself contains all the colours. The more pure these substances are, the more decidedly do they reflect the simple colours, never, however, by an absolute or independent property, which, by the way, it is not necessary they should do in order to represent the effects of nature.

To explain then the principles upon which Dioramic paintings are executed and lighted up, take as an example the effect produced when light is decomposed; that is to say, when a portion of its component rays is intercepted. Put upon a canvas two colours—the brightest possible—the one red, the other green, both as near as may be of the same intensity. Now, interpose a red medium, as a coloured glass, in the stream of light which falls upon them—what happens? The red colour reflects the rays which belong to it, the green remains black. Reverse the experiment by interposing a green glass—the effect is also reversed; the green colour gives forth its proper reflection; the red is now black. The effects, indeed, are not perfect unless the interposed media completely exclude all rays but their

own, a condition not easily obtained, for coloured media have rarely the power of excluding all but one ray.

The general effect, however, is sufficiently determined, to apply this principle to dioramic paintings, though in these paintings there are only two effects represented, one of day in front, one of night behind. These effects, not passing the one into the other without a complicated combination of the media which the light had to traverse, produce an infinity of other effects similar to those which nature presents in her transitions from morning to night, and the reverse. It must not be imagined that it is necessary to employ media of very intense hues in order to obtain striking modifications of colour, for often a slight shade in the medium suffices to operate a very great change in the effect.

It will be understood from these principles of dioramic art, in which striking results are obtained by a simple decomposition of light, how important it is to observe the aspect of the sky when we would appreciate the tone of a picture, whose colouring matters are thus subject to decompositions so great. The best light for this purpose is that from a pale sky; for where the sky is blue, it is the blue tone of the picture also, and consequently its cold tone, which comes out most powerfully, while its warm tones remain inactive. Their media are not present, and they are cast comparatively back into neutral tints by the blue medium of the sky—so favourable to the cold tones of the picture. It happens on the contrary, when the sky is coloured, that the warm tones of the picture—its reds and yellows—come forth too vigorously, and, overpowering its colder tones, injure its harmony, or, it may be, give it quite a different character—a warm instead of a cold tone of colour. It is easy to understand from these observations that the uniform intensity of colours cannot be maintained from morning to evening. We may even venture to assert it to be physically demonstrated that a picture cannot be the same at all hours of the day. This, perhaps, is one of the causes which contribute to render good painting so difficult to execute and so difficult to appreciate. Painters led into error by the changes which

take place between morning and evening in the appearance of their pictures, falsely attribute these alterations to a variation in their manner of seeing, and colour falsely, while in reality the change is in medium—in the light.

THE END.

INTRODUCING THE APHS

The American Photographic Historical Society is a non-profit, chartered educational organization founded in December of 1968 as the Society for Photographic Collectors. On incorporation, the name was changed to the Photographic Historical Society of New York, reflecting the preponderance of membership and activities in the Greater New York Area.

In December of 1982, the membership voted to change the name to one more suited to the broadened national and international character o;f the membership: the AMERICAN PHOTOGRAPHIC HISTORICAL SOCIETY was established.

Purposes: The Society is dedicated to two major goals. (1) To proved a forum for individuals interested in learning more about the historic development of photography and some of the technical and cultural aspects of the impact of photography on our photographic heritage, and (2) to function as an assertive force in the community in encouraging individuals and institutions to better appreciate, and to collect and preserve the numerous facets of this priceless heritage.

Meeting Society goals: To meet the educational objectives of the Society, a variety of activities have been conducted throughout the history of the organization. Educational meetings presenting historians, authors, collectors and specialists from related fields are open to the public ten times a year.

Publication of a professionally-executed periodical, *Photographica*, special events such as fairs, seminars, auctions and field trips to distant points where the Society can meet and share this field of interest with others; sponsorship of monographs distributed at no cost or low cost to members; creation of a bi-annual membership directory to assist collectors to find each other; maintenance of a modest research library at a central facility in midtown Manhattan; and further special projects as provision of lecturers to local colleges and general photography clubs, organization of displays of photography clubs, organization of displays of photographs and studio and darkroom equipment for exhibits in museums, exhibit halls and in educational institutions; and an information center on general photo history for the public at large are activities, provided by members working alongside volunteers.

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